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Indexed in the Industrial Arts Index. Published every Thursday. Subscription Price United States, its Territories and Canada $8; other Western Hemisphere Countries $15; Foreign Countries $20 per year. Single copy, 35c. Annual Review Number, $2.00.

Cable Address, "Ironage" N. Y.

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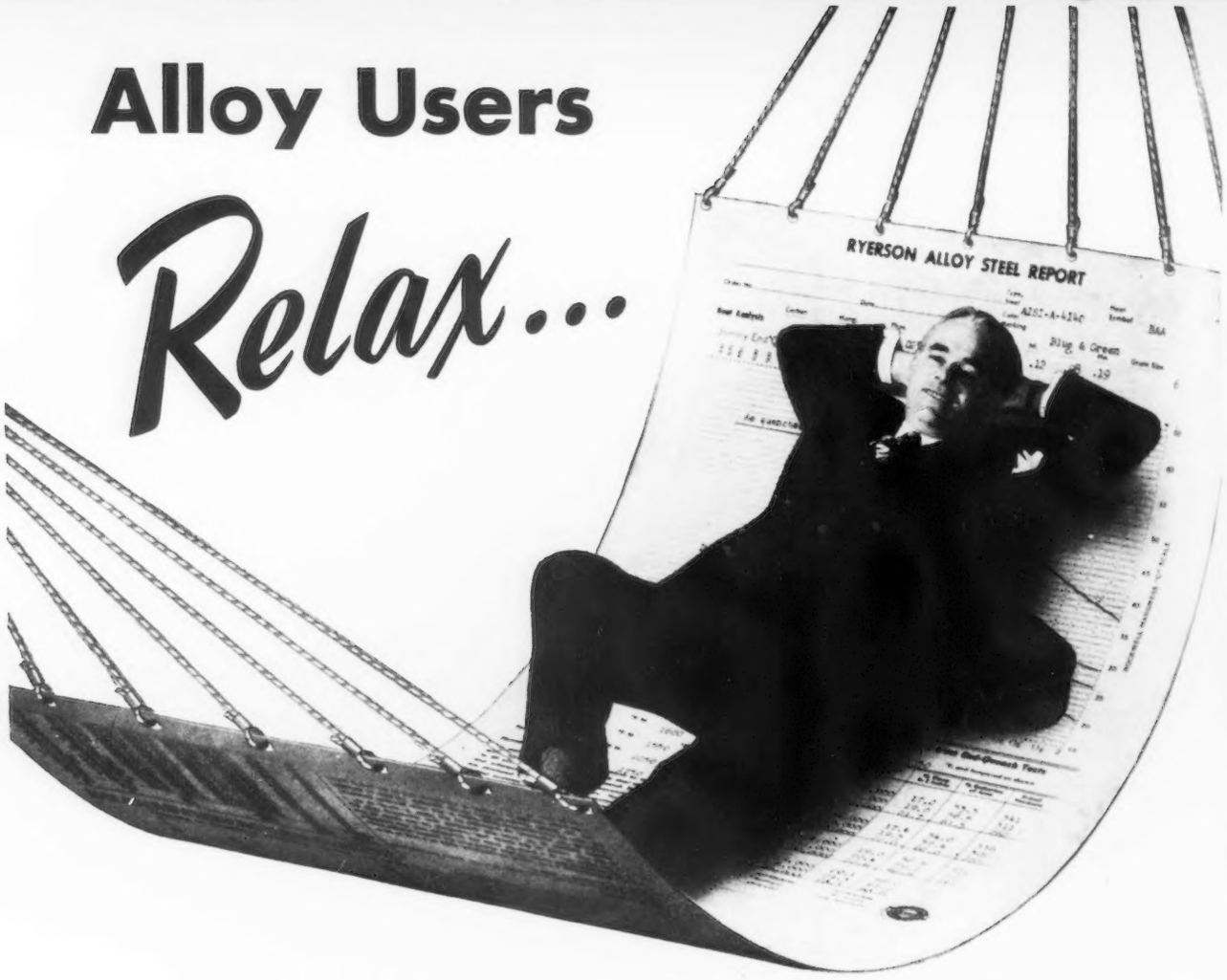

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The IRON AGE

100 E. 42nd ST., NEW YORK 17, N. Y.

ESTABLISHED 1855

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MAY 13, 1948

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Pugs, Profits And Progress

For the second time, a murderous right dropped his dusky opponent. As Gus moved to a neutral corner the referee picked up the timekeeper's toll. The fight was over. Madison Square Garden was vibrating with the tense and noisy emotions of a packed audience. It took Gus Lesnevich, the light heavyweight champion, exactly 118 seconds to prove a just title to this crown of pugilism.

In one respect the victory of Gus transcends the lusty atmosphere of New York's Eighth Avenue arena. Gus collected $51,390 for his brief though violent efforts. This works out at the rate of $435 per second. It is here that the Society for the Elimination of Special Privilege sees a "challenge."

To be sure, Gus is a performer of merit, a family man, a credit to the profession, and an incentive to every aspiring young pug. However, claims the S.E.S.P., there is no just relation between his efforts and the fabulous compensation he drew down. On the same card with Gus that night were hard-working preliminary fighters who toiled arduously for six and eight and ten rounds. Some of those boys were also good to their parents and creditable citizens. They worked much harder than Gus and provided earnest, if dull, entertainment at the gory cost of bashed beaks and darkened orbs. Yet some of them drew down less for a full and painful tour of duty than Gus did for one of his 118 seconds.

Such discriminatory compensation, averred the S.E.S.P., was abhorrent to every principle of justice. It is precisely such discrimination and the resultant disparities in income that create classes and invidious upper income brackets. Is it any wonder that the community is consumed by social unrest and "honest men" question the merit of free enterprise?

Let's assume that these boys in shining armor, blazing with virtue, place a limit upon the profits of pugs, so that henceforth no ambitious youngster with energy, guts and talented fists can get what Gus got for his 118 seconds of homicidal fury (which the customers, incidentally, loved). Suppose that every boy with fistic ambition were assured of "fair and just" pay, that the prizes of pugilism would be divided more "equitably," so that a brilliant Gus of the future who could polish off a rugged opponent without getting his own hair mussed could get no more than the plodding preliminary performer who actually worked harder.

At this point we would ask any class of grammer school boys what would happen to the business of punch-tossing. The boys would tell us, we are sure, that the noble profession of fisticuffs under such conditions would lose its appeal. Why endure the monotonous grind of training, the sure pummeling in the ring? Why invite the high probability of failure and the mortification of defeat if there is no chance if a jack pot reward?

Is this not precisely the position in which the business promoter, the artificier in economic risk finds himself today? Why fight if a fatuous social mood condemns high profit and a contraceptive tax system sterilizes the very spirit of enterprise?

Joseph Stagg Lawrence

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► A high official of an aircraft company has declared privately that the 70-group air force would require about 30,525 tons of steel, or about 3½ hr of the total steel production per year. It would also require about 16 days of the total aluminum production at its present rate. While the steel tonnage required is not so large, its impact on the industry might be magnified by strong pressure on production of special types of high grade alloy steel.

► One implement maker has had a cast magnesium gear case on a combine in field test for 3 years. The surface of the case was not protected. It is now reported that the magnesium corroded much less than does ordinary cast iron and has otherwise stood up well in service.

► The steel blackmarket in France is receding. Latest reports indicate that the premium for carbon steel coupons (used in the allocation system there) has decreased 25 pct to about $25 per ton. Premiums are no longer being paid for pig iron for castings. Thin sheets, however, are in some cases still bringing premiums of as much as $100 over the established price. The general picture is so encouraging that the government is considering abandoning its allocation system for steel in favor of free trade.

► By subjecting "cermets", sintered mixtures of compressed metal and refractory powders, to thermal shock, the breaking strength has in cases been doubled. These high temperature materials are engineered for service around 5000°F. The thermal shock treatment consists of inserting the cold cermet into a furnace held at 2400°F. The sintered material is held for a short period at the shock temperature and then withdrawn and allowed to air cool.

► Cancellation of oil burner orders, attributed largely to oil shortage scares, continues to exceed new orders. Despite the declining production which began last October, unfilled orders have been reduced from a million plus to less than 150,000 in a year's time.

► While there is no assurance that a light car will be introduced by any of the established car producers, all manufacturers admit they have light cars running on their proving grounds. They explain such tests are absolutely necessary so they won't get caught flat-footed in case somebody scores a smash hit with a new light car.

► Under the terms of a new trade agreement between Sweden and the Anglo-American zone of Germany, Sweden will ship Bizonia 1,750,000 tons of iron ore. Many Europeans are expecting the U. S. to import Swedish ore within the framework of ERP. They also report growing U. S. interest in Liberian and Algerian ore deposits.

► Main difficulty in appraising the possible effects of the basing point decision is that current steel demand can not be called normal. Most steel firms are not absorbing any more freight than they have to. In the current market the consumer will gladly pay f.o.b. mill price plus freight. The full impact of discarding the basing point system will not be felt until steel supply and demand return to a normal status. Barring Congressional action, geography would then determine what producers and consumers could survive.

► The pressure of rising costs on metal powder producers has caused them to study their less profitable products and increase prices or drop them. Chromium metal powder in the purity normal to metal powder manufacturers is no longer being produced. Producers of nickel and solder powders are about to raise their prices.

► At a time when the steel industry is taking the lead in the fight on inflation, many business men are privately expressing their belief that ERP and the defense program will produce dangerous inflationary trends. Many also see the coming of strict controls. They argue that $5 billion a year expended on things which have no tangible return to people in this country means shortages, higher prices, higher costs, and bigger wage demands. Congressmen who predict continued "creeping inflation" are not helping steel's fight either.

► The increased cost of building steel plant in recent years is highlighted by the $32 million cost of a new hot strip mill whose 14 year old counterpart in the same plant cost only $10 million.

Quality Control of

o o o

By AMIEL GELB
Chief Testing Engineer
Reynolds Metals Co.,
Louisville

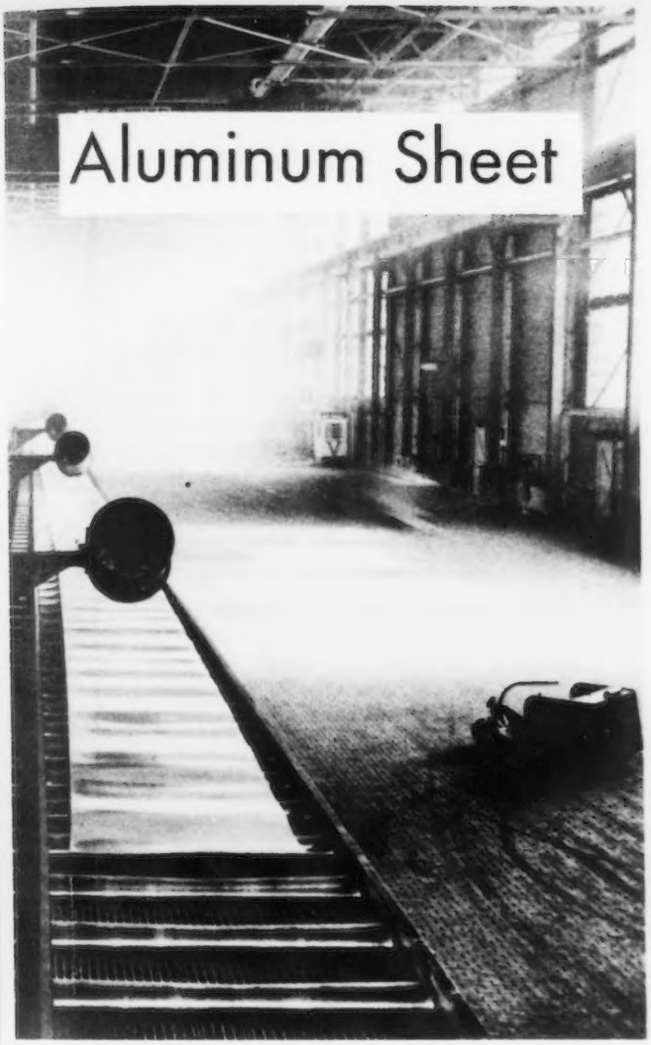
THE tremendous expansion in aluminum production during the past few years had its greatest impetus as result of World War II, and has lost little momentum in the succeeding postwar period. Of the various commercial forms of aluminum, the greatest proportion is produced as sheet. Although the major utilization of aluminum sheet during the war was in highly-stressed aircraft components, the bulk of present-day sheet production finds its way into products such as paneling, roofing, air-conditioning ducts, housings of all sorts, cooking utensils, and numerous other noncritically stressed products.

The laboratory tests for evaluation and for quality control of sheet produced during the war emphasized the structural characteristics of the metal. Accordingly, the tests established for routine control and those specified by the armed services called for mechanical property determinations; tensile strength, yield strength and elongation. These tests were performed on thousands of samples each month, and since these determinations were expensive and time consuming, simplification of routine laboratory procedures — for materials not intended for critical structural applications—was a task undertaken by the physical testing laboratories of the Reynolds Metals Co. soon after the end of the war. The revisions took cognizance, first of all, of the advances in rolling practice that were not prevalent at the time most government specifications had been written. According to the specifications, one sample for each 1000 lb. of sheet was required for mechanical testing. Such sampling procedure becomes antiquated, however, for modern rolling practices in which a continuous coiled sheet is produced from a single ingot weighing from 2000 to 4000 lb.

Thus, with careful control of the chemical composition of the ingot and with precise rolling practices, it was found that a single test specimen taken from a modern, large-sized coil, adequately represented the mechanical properties and general quality level of the coil. The first step, therefore, was to establish the full coil as the basic unit for sampling, rather than the arbitrary 1000 lb. called for by the specifications. Not only did this method alone reduce the number of samples by over 50 pct, but it placed quality control of the sheet on a rational, as well as on a practical, basis. The identification number assigned at the time of rolling to each major coil was retained throughout all subsequent operations and shown on the final packed product, be it flattened sheet or a series of small strip coils. Usually the sample submitted to the laboratory for testing was a panel 10x10 in., taken from each major coil by the inspection department in accordance with a standardized procedure.

The next step in the simplification program was to determine whether any of the existent hardness test methods could be effectively utilized. The investigations undertaken and the resulting procedures that were adopted are described in this article. Utilization of these new methods was instru-

Aluminum Sheet



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Application of hardness testing as a measurement of quality control of aluminum sheet has made possible significant savings in cost of routine inspection. The Brinell hardness test has not been found suitable for this purpose, but the Rockwell test has proved satisfactory. Data are presented in this article for conversion from one Rockwell scale to another and for correlating tensile strength with hardness.

mental in effecting a substantial saving in the cost of routine production testing without in any way sacrificing the quality level of the end product.

Since much of the published data on aluminum alloys list the hardness in terms of the 500 kg (10 mm ball) Brinell test, attention was given to this method early in the investigation. It soon became apparent that although the Brinell test has merit for certain classes of products, its usefulness for sheet thinner than $\frac{1}{4}$ in. is very limited. In addition to the limited accuracy of the test and its susceptibility to personal failings of the operator, it also is more time consuming than other hardness tests, particularly the Rockwell.

The favorable characteristics of the Rockwell machine are well-known. They are simplicity of operation, direct reading, minimization of personal factors, and accuracy of response. Of the two Rockwell machines commercially available, the Standard and the Superficial, the latter machine is designed primarily for hardness measurement of thin materials.

The multiplicity of possible scales and the large number of scales often encountered is one of the obvious disadvantages of the Rockwell systems. Although manufacturers of the Rockwell testers consider ten different scales appropriate for nonferrous alloys, utilization of the entire group would serve only as a source of confusion.

In the course of the investigation, it was found that one Superficial scale and no more than three Standard Rockwell scales thoroughly cover the full range of aluminum sheet alloys. The scales are:

Superficial	"15-T"	— 1/16 in. ball penetrator, 15 kg load
Standard	"H"	— 1/8 in. ball penetrator, 60 kg load
Standard	"E"	— 1/8 in. ball penetrator, 100 kg load
Standard	"B"	— 1/16 in. ball penetrator, 100 kg load

The scale selected for a particular sample should preferably result in a reading falling within the range of the scale, i.e., it should not be negative, nor greater than 100. Therefore, for thin sheet from 0.010 to 0.040 in. thick, the Superficial 15-T scale is particularly suitable since the readings for all commercial alloys—from the softest to the hardest—fall within the range of the instrument. Even though the limitations common to hardness measurements of the Rockwell type are present also

TABLE I

Typical Mechanical Properties and Rockwell Hardness Control Ranges for Several Aluminum Sheet Alloys

Alloy	Thickness in.	Mechanical Properties: Tensile Strength p.s.i.	Elong. in 2 in., Pct	Rockwell Hardness: 15T	H	E
2S-O	0.008-0.012	12,000—15,500	15	25-35	—	—
	0.013-0.019	12,000—15,500	15	25-32	—	—
	0.020-0.032	12,000—15,500	20	18-28	—	—
	0.033 and over	12,000—15,500	25	—	38-48	—
2S-½H	0.008-0.019	16,000—20,000	1-2	52-58	—	—
	0.020-0.032	16,000—20,000	3-4	50-56	—	—
	0.033 and over	16,000—20,000	5-6	—	80-86	—
2S-H	0.008-0.019	22,000—26,000	1	60-65	—	—
	0.020-0.032	22,000—26,000	1-2	56-64	—	—
	0.033 and over	22,000—26,000	3	—	90-97	—
3S-O	0.008-0.012	15,000—19,000	18	39-49	—	—
	0.013-0.032	15,000—19,000	20-23	33-44	—	—
	0.033 and over	15,000—19,000	25	—	58-68	—
3S-½H	0.008-0.012	19,500—24,500	1	58-64	—	—
	0.013-0.019	19,500—24,500	2	57-63	—	—
	0.020-0.032	19,500—24,500	3-4	57-62	—	—
	0.033 and over	19,500—24,500	5	—	88-93	—
3S-H	0.008-0.012	27,000—31,000	1	66-70	—	—
	0.013-0.019	27,000—31,000	1	65-70	—	—
	0.020-0.032	27,000—31,000	2-3	63-68	—	—
	0.033 and over	27,000—31,000	—	—	94-99	—
52S-O	0.008-0.019	27,000—31,000	15	60-65	—	—
	0.020-0.032	27,000—31,000	18-20	58-62	—	—
	0.033 and over	27,000—31,000	20	—	85-90	—
52S-H	0.008-0.019	39,000—44,000	3	78-82	—	—
	0.020-0.032	39,000—44,000	3	77-81	—	—
	0.033 and over	39,000—44,000	4	—	—	85-90

in the Superficial tester, the 15-T scale has been found an excellent basis for comparison of aluminum sheet. The limitations inherent in hardness determinations with either instrument must not, however, be overlooked.

The important variables affecting hardness readings are:

Surface.—Conditions affecting the test results relative to the surface are cleanliness, texture, and absence or presence of cladding. For accurate results it is important to remove dust or oil films from the area being tested. Although the surface texture normally produced is smooth and flat, care must be taken, in cases where the sample had been wrinkled or its surface marred, so that the test locations possess comparable surface characteristics. The effect of a cladding on the hardness of the sheet is to lower the readings, since most cladding materials used to enhance the corrosion resistance are softer than the core alloys.

Alloy.—The composition of the different alloys, their work-hardening rate, the degree of previous cold working, and the thermal treatment, all influence markedly the hardness readings.

Fabrication.—Quite often it is possible, by differing fabrication methods for the same alloy, to arrive at final sheet products having identical mechanical properties, yet differing in some other respect, such as grain size or crystal orientation. These fine differences will not be detected by the Rockwell hardness test, although they may be a factor in the variability of the readings.

Thickness.—The effect of material thickness is especially noticeable in the lighter gages. The

TABLE II

Typical Rockwell Hardness of Several Heat-Treatable Aluminum Sheet Alloys

Alloy	Typical Mechanical Properties: Tensile Strength Psi	Yield Strength Psi	Elong. in 2 in. Pct	Thick-ness, In.	Typical Rockwell Hardness Values: 15-T(1)	H(2)	F(3)	E(4)	B(5)
24S-O	27,000	11,000	18	0.040	56-62	81-89	38-52	44-57	—
24S-T	68,000	46,000	19	0.040	83-86	111-115	97-101	98-101	71-77
Clad 24S-T	64,000	43,000	18	0.040	77-84	110-113	92-99	96-100	63-70
R361-O	18,000	8,000	22	0.040	39-44	63-68	7-1	10-17	—
R361-W	35,000	21,000	22	0.064	68-74	96-103	75-79	70-80	—
R361-T	45,000	40,000	12	0.064	76-82	100-110	84-94	84-94	50-55
R301-O	25,000	10,000	22	0.040	50-58	75-85	30-40	40-49	—
R301-W	62,000	41,000	19	0.040	82-84	110-112	93-97	95-98	62-69
R301-T	68,000	60,000	10	0.040	86-89	113-116	100-103	100-103	76-79
R303-O	30,000	15,000	19	0.064	61-63	89-91	52-55	57-59	—
R303-T315	74,000	67,000	8	0.064	87-90	118-120	107-110	108-110	87-91
R303-T275	77,000	70,000	8	0.064	89-91	119	108	110	90-93
Clad R303-T315	67,000	62,000	8	0.091	62-70	105-110	84-94	92-98	64-71
Clad R303-T275	72,000	66,000	8	0.091	62-75	105-110	85-95	93-100	64-71

(1) 15-T scale — 1/16 in. ball penetrator, 15 kg load (Superficial)
(2) H scale — 1/8 in. ball penetrator, 60 kg load (Standard)
(3) F scale — 1/16 in. ball penetrator, 60 kg load (Standard)
(4) E scale — 1/8 in. ball penetrator, 100 kg load (Standard)
(5) B scale — 1/16 in. ball penetrator, 100 kg load (Standard)

thinner the sheet, the more pronounced is the anvil effect, or the impression on the underside of the specimen. This effect must not be overlooked in comparing hardness values of different thicknesses of the same alloy. From the practical point of uniformity of results, a 3/16-in. diam spot anvil has been found most successful.

Having determined the Rockwell hardness of a specimen, what is its significance? Obviously, an individual reading to be significant must, first of all, be capable of consistent duplication. Generally speaking, readings taken on a homogeneous, properly-supported specimen will not vary by more than two points from each other. However, since the possibility exists that a single reading may not be representative of the sample, it has been found expedient to obtain five readings on each specimen. The average of these readings is used in reporting all hardness tests and in comparing these values with other characteristics of the metal. Rockwell data contained herein are in all cases the average of five fairly consistent readings.

Aside from the limitations already discussed, it should be remembered that the term "hardness" is by no means a precisely definable property. As aptly stated by Hoyt[2] one must not assume that two different metals are equally hard when they have the same hardness number, or that a cold-worked metal with twice the hardness of an annealed metal is twice as hard; all that is known is that a metal, when processed in a certain way, either does or does not have a required hardness number. Hence, according to Hoyt, the theoretical features, which exclude the test from being a true measure of hardness, play no part in the application of the test in technical practice when properly done.

It is by this practical approach that a great deal of usefulness was derived from the hardness data, arriving at the following procedure:

From each test panel representing a large metal coil, a test coupon $^3/_4$ in. wide by 10 in. long is cut, with an additional strip taken from every tenth coil. The duplicate samples from the tenth coils are machined into regular ASTM test specimens for determination of the usual mechanical properties. Rockwell hardness, on a scale appropriate for the particular alloy and gage, is determined on all the other samples. The test readings for a particular metal are then compared with the limits previously established from frequency distribution data, while the tensile test results serve as a continuous check on the reliability of the observations. All test data are tabulated and the control limits revised in accordance with quality control chart methods.

Typical hardness ranges for aluminum alloy sheet, applicable to certain fabrication practices, are shown in table I. It must be emphasized that these values are not intended, nor should they be considered as supplanting specification requirements for these metals; they are merely illustrative of the control method described.

Table II contains information relative to Rockwell hardness of some typical heat-treatable alloys even though such data are not at present used in controlling the quality of the materials. This information is not altogether academic, however. Its usefulness in rapid alloy identification is discussed in succeeding paragraphs.

As already mentioned, the numerous Rockwell scales which may conceivably be employed are a confusing factor in their use. Therefore, even though the relationship between several of these scales is known, it seems advisable to confine oneself to the four scales recommended earlier. Ready conversion from one scale to the other may be accomplished by means of fig. 1, although the scatter

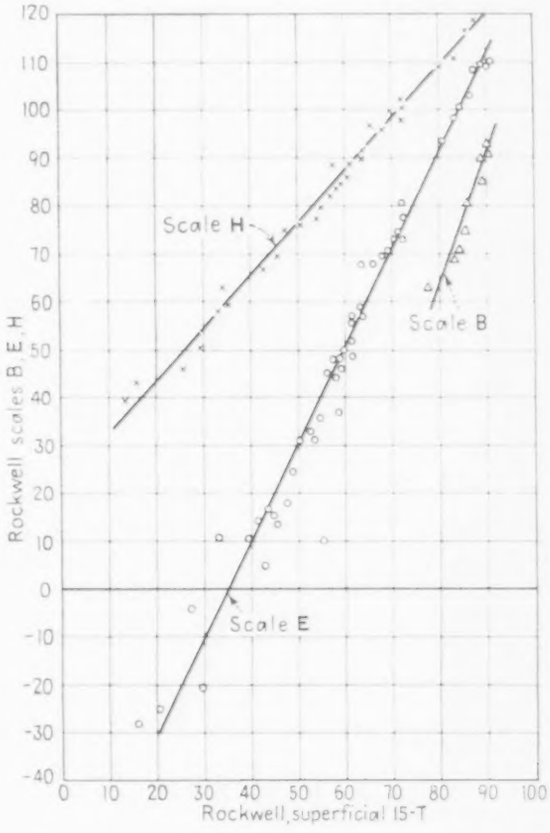


FIG. 1 - Rockwell hardness conversion chart for aluminum alloy sheet.

of the plotted data indicates the approximate nature of this information. It is doubtful, in fact, that precise conversion relationships exist except upon restricting the scope of the data to narrow limits of alloy and gage. Nevertheless, fig. 1 fills a real need that has often arisen in the laboratories of both producers and fabricators of aluminum.

Conversion information of the same order of accuracy is given also in table III. Brinell hardness numbers are included in this table also, so that the prevalent Brinell data may be related to the type of hardness tests appropriate for sheet.

Accumulated hardness data may be analyzed for correlation in terms of some particularly desirable property, such as tensile strength or formability. It is quite evident, of course, that the more segregated the data in regard to spe-

1. *ASTM Proceedings, Vol. 43, 1943, p. 811.*
2. *S. L. Hoyt, "Fundamentals of Hardness Testing," ASTM Proceedings, Vol. 43, 1943.*
3. *V. H. Patterson, "Distinguishing the Common Aluminum Alloys," Metal Progress, February 1946.*

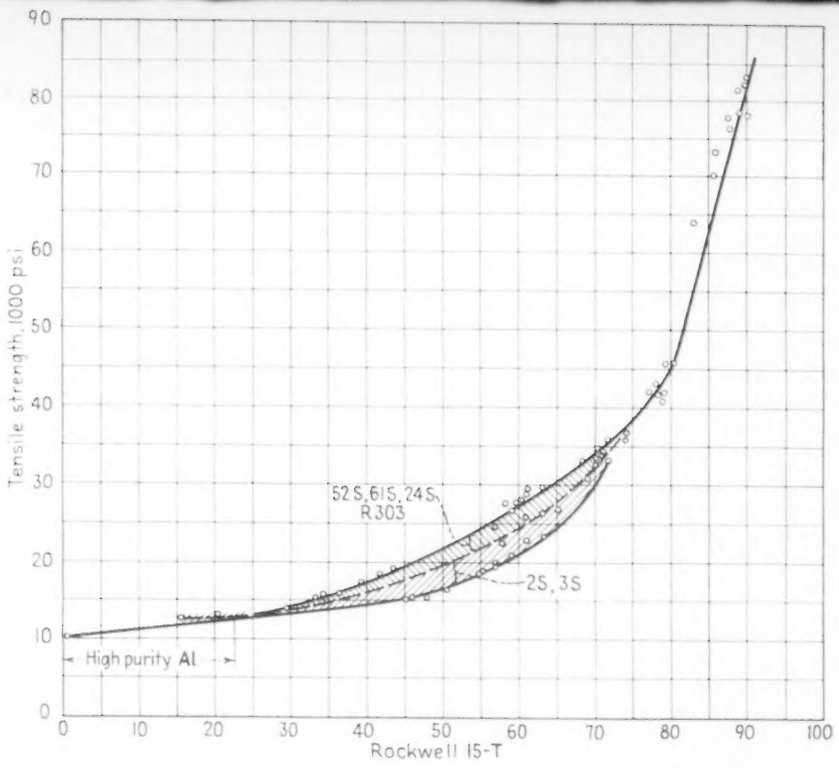


FIG. 2 - Correlation of superficial Rockwell hardness with tensile strength for bare aluminum sheet 0.010 to 0.064 in. thick.

cific classes and sizes of alloys, the higher is the likelihood for accurate correlation. Indeed, such carefully segregated data are needed if hardness is to be employed as a quality control tool. Furthermore, it is quite conceivable that certain classes of aluminum alloys may someday even be purchased on the basis of hardness tests alone, as are some types of steels and brasses. Specifications of this type must, however, be carefully prepared with a full understanding of their limitations.

To cite a recent case of misuse of the hardness test: A manufacturer, after much experimenting with various aluminum alloys, was finally successful in fabricating an intricate product by using a particular alloy 0.012 in. thick, and to assure himself of uniform raw material, engaged the services of a commercial laboratory to draw up simple specifications. That particular laboratory, not being too familiar with aluminum alloys (having specialized in steel), specified for this sheet hardness limits of 20 to 25 R$_B$. Notwithstanding the protestations of the aluminum producer, the customer remained adamant in his insistance on retaining the specification.

The producer, naturally, brought out the fact that the specified Rockwell scale resulted in pronounced anvil effect and was therefore entirely unsuitable for the particular sheet. Sometime later, however, the manufacturer desired the thickness changed to 0.010 in., retaining the identical alloy and temper of the sheet, and again specified the hardness limits used previously for the thicker material. As might be expected, the anvil hardness affected the new readings even more than in the preceeding case, so that in order to meet the 20 to 25 R$_B$ hardness the producer was required to supply aluminum sheet stock considerably softer than was actually desired. The resulting delay and needless expense could have been easily averted had the underlying factors pertaining to hardness of aluminum been understood.

As in most metals, so in aluminum alloys, there is a general correlation between hardness and mechanical properties. This paralelism, though not precise, is particularly evident between Rockwell hardness and tensile strength. A similar trend exists also with reference to yield strength,

TABLE III

Comparison of Rockwell Hardness with Brinell Hardness Values for Aluminum Sheet Alloys

15-T	E	H	B	500 kg(2) Bhn
10	—	33	—	—
15	(—35)(1)	38	—	—
20	(—30)	43	—	—
22	(—27)	46	—	—
24	(—23)	48	—	—
26	(—19)	50	—	—
28	(—15)	52	—	—
30	(—11)	55	—	—
32	(—7)	57	—	—
34	(—2)	59	—	(27)
36	2	61	—	(28)
38	5	63	—	(29)
40	10	65	—	(30)
42	14	68	—	(31)
44	18	70	—	(32)
46	22	72	—	(33)
48	26	75	—	(34)
50	31	77	—	(36)
52	34	79	—	(37)
54	39	81	—	(39)
56	43	83	—	(41)
58	47	85	—	(42)
60	51	88	—	(43)
62	55	90	—	(46)
64	60	92	—	(50)
66	63	94	—	(52)
68	68	96	—	(57)
70	71	99	—	60
72	76	100	—	67
74	80	(103)	—	74
76	84	(105)	—	84
78	88	(108)	58	87
80	92	(110)	63	94
82	97	—	69	105
84	100	—	75	111
86	(105)	—	81	130
88	(109)	—	86	140
90	(112)	—	92	145

(1) Parentheses indicate unsuitable scale for particular hardness value.
(2) Brinell hardness number—500 kg load, 10 mm ball, 30 sec.

although the correlation is lower. The extent of the general relationship between the Superficial 15-T hardness and the tensile strength of bare (not cladded) aluminum sheet is shown in fig. 2.

The author expresses his appreciation to his associates, including M. F. Rupp, L. E. Becht and E. A. Krause, for their assistance and confirmation of data used in this article.

For approximate estimates this graph has been found every useful. The plotted data fall into three parts according to alloy groupings. The lower left corner of the graph pertains to tensile-hardness relationship for high purity aluminum sheet; the lower cross-hatched band is significant for 2S and 3S; and the upper band as well as the extended curve are appropriate for sheet alloys 52S, R361, 61S, 24S and R303.

The great value and economy of Rockwell hardness tests in quality control methods were already described. Due to their versatility, these tests have been extensively applied to the solution of other practical problems also. For segregation of mixed alloys and for identification of materials of unknown alloy or temper, the hardness test is both inexpensive and rapid, especially when combined with spectrographic analysis. Users of aluminum who do not possess spectrographic equipment may utilize chemical spot test methods[3] in conjunction with Rockwell hardness tests for alloy and temper identification. Since the indentation of the Superficial hardness test is so slight, it is used wherever possible to identify drawn, formed, or otherwise fabricated parts, that must not be destroyed in testing. Finally, the Superficial test has been found invaluable for identification of very small samples and intricate parts.

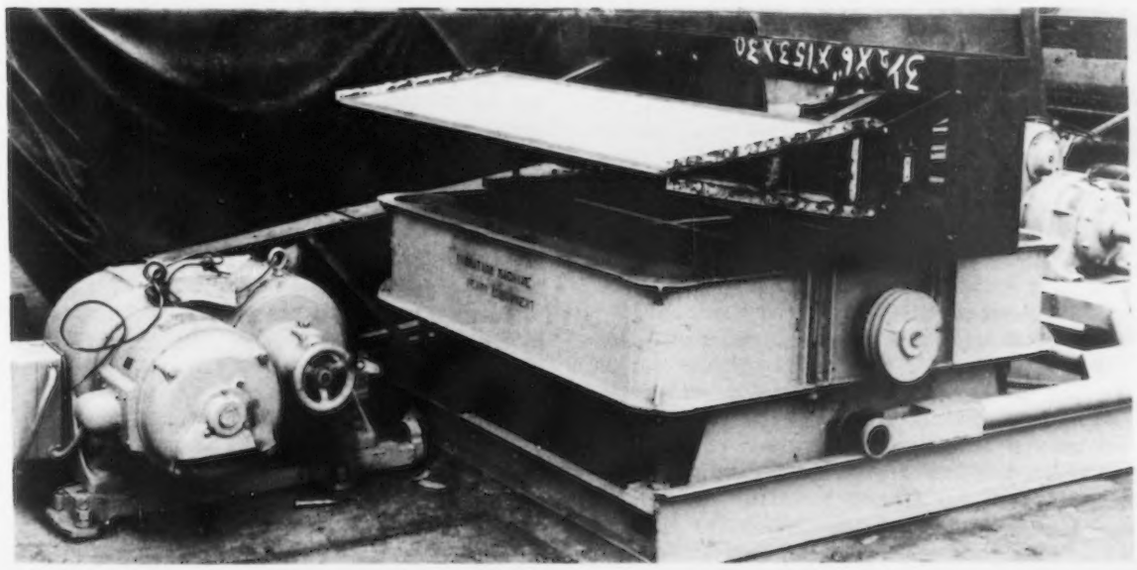
Fatigue Testing Heavy Structures

FATIGUE testing of structures up to 1500 lb. in weight has been performed for the past several years at the Douglas Aircraft Co., by means of a heavy duty vibration table. Although emphasis has been placed on the testing of aircraft structural components, this procedure is said to be also applicable to making vibration tests on washing machines, portable and automobile radio equipment, and other automotive accessories. In fact, on any piece of moving equipment before it arrives in the field, the equipment's resistance to fatigue may be accurately determined.

For example, in the case of washing machines, the vibration table can shake a moving part used in the machine in a matter of hours to simulate the fatigue from vibration it would receive over a period of many years. By running it through various vibration frequencies from low to high, to determine its natural frequency, then building the item's mount to withstand this frequency, the life of the product may be extended substantially. In the aircraft industry no moving part would be installed in an airplane without complete fatigue testing upon such equipment as the vibration table. Another interesting application would be in the setting up of concrete forms—vibrating the cement to make it harder in a brief span of time.

The vibration table is built of structural channels and is mounted to a substantial base by means of adjustable rubber shock mounts at the four corners. A 2-in. shaft mounted in special bearings in the table carries four adjustable eccentric weights which supply the force to vibrate the table. The excursion of the table is thus dependent upon the eccentric weights, the shock mount adjustment, the mass of the load, the frequency applied, and the relationship of this frequency to the resonant frequency of the table and its load.

The method by which the part to be tested is attached to the table varies with the type of component involved. Control surfaces, for example, are attached to a hinged steel pipe on the table. The accompanying figure indicates a method for setting up the testing procedure for an aircraft component.



Strain Aging Criteria

By GEORGE SACHS
Case Institute of Technology, Cleveland

A compact, correlated review of the characteristics of that complex phenomenon, associated with coldworked steel, known as strain-aging. Of particular interest is the listing of 72 significant references covering some 40 years' study on the various aspects of the subject. Also presented is a listing of the various criteria suggested and used for establishing the susceptibility of a steel to strain aging.

THE term strain aging designates any change of mechanical properties occurring when a coldworked steel is "aged" at room temperature, or at any temperature below the softening or recrystallization temperature, see fig. 1. While similar changes also occur in annealed or normalized steel, if cooled rapidly, such a "quench aging" is absent in sufficiently slowly cooled steel. Also, the quench aging relations are rather different from the strain aging relations. The strain aging relations are affected by rapid cooling, preceding the coldwork and aging, only to an insignificant extent.[53]

The changes in mechanical properties which characterize the strain aging phenomenon are very complex. In numerous instances, strain aging is a source of considerable difficulty during the fabrication or the service of steels. Among such problems the following two are particularly important, and have been the subject of numerous investigations:

(1) The embrittlement of boiler steel plate[2,17] and other steel parts.[1,3,13]

(2) The deterioration of the drawing qualities of sheet.

In the first definite observations on strain aging, a gradual embrittlement of steel plate with time at room temperature was observed in regular bending tests,[1,2] or impact bending tests.[3] Later, notched bar impact tests were used primarily to test the susceptibility of boiler plate to strain aging which was made responsible for the brittle failures encountered. It appears that an improvement of the impact strength characteristics of a steel, such as obtained by either a nickel content[12,17,21,30,37,42] or by proper deoxidizing,[16,30,42] also reflects an actual improvement of the service properties.

The instability of deep drawing sheet consists of a progressive reduction of its forming quality; and it is said that commercial, rimmed, low carbon steel becomes unsuitable for automobile body work if not used within ten days after temper rolling. It appears that the deterioration of the forming quality consists of two components; (1) the gradual increase in strength (and hardness) associated with a corresponding decrease in elongation, fig. 1, and (2) the reappearance of stretcher strains, which are correlated with the yield point jog, both having been eliminated in the as-supplied sheet by a skin pass of suitable magnitude, fig. 2. While plant tests indicate a markedly improved performance of "extra deep drawing sheet steel" which has been "stabilized" or rendered nonaging[15,49,50,53,62,63,72] by thorough deoxidation and slow cooling, laboratory tests apparently have failed to clearly reveal such a difference, so far.

General Strain-Aging Relations

Both strain aging and quench aging are considered to be precipitation hardening phenomena and follow the general laws governing such processes. However, while a supersaturated solution of carbon in alpha iron accounts for quench

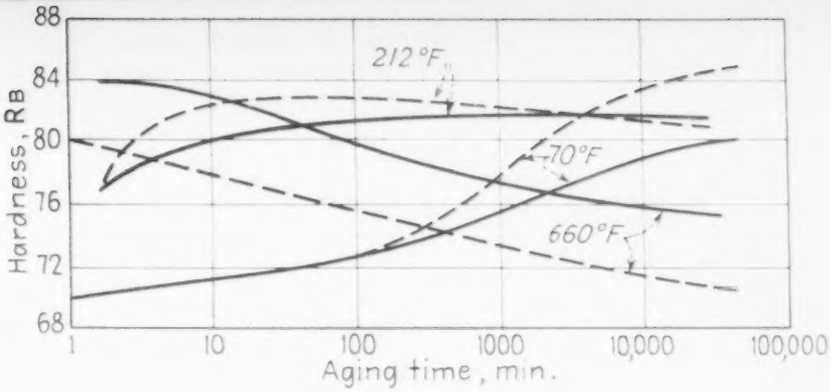


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FIG. 1 - Strain aging of a low carbon steel after rolling by 10 to 15 pct reduction. Solid lines indicate steels in the non-preaged condition; dotted lines indicate steel preaged at 212°F for 17 hr before rolling. (Davenport-Bain, 1936).

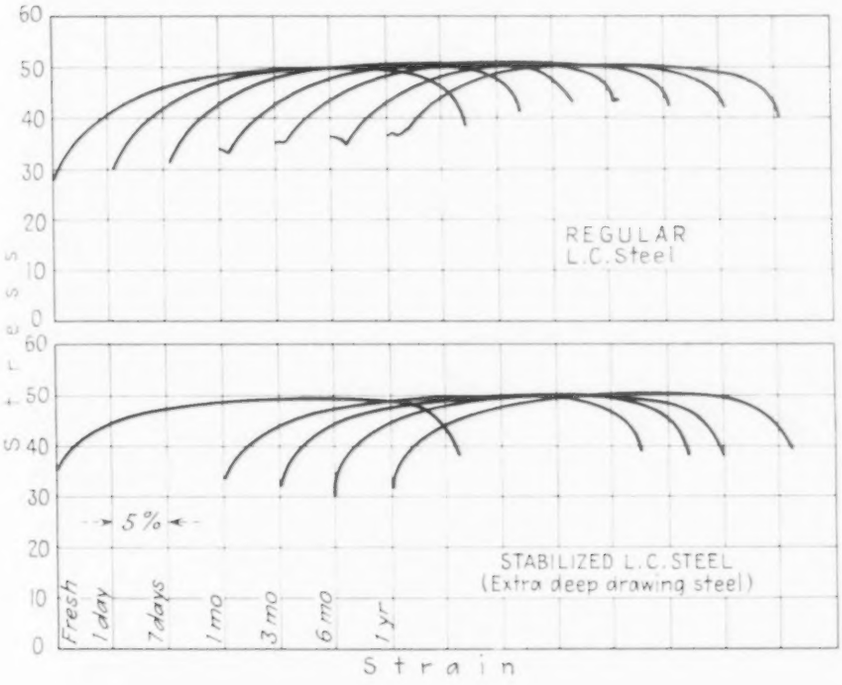

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FIG. 2 - Effect of aging at room temperature on the stress-strain curves of two temper-rolled low carbon steel sheets. Time intervals along the abscissa represent aging times at room temperature. (Griffis-Kenyon, Burns, 1933).

BELOW

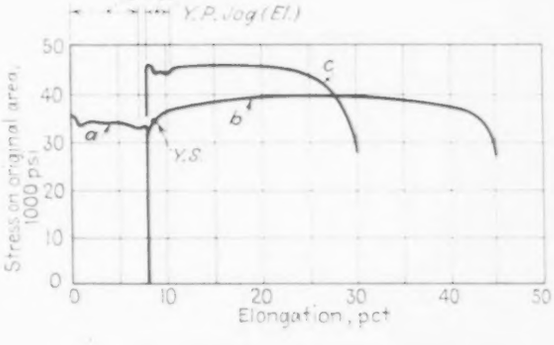
FIG. 3 - Effects of stretching and subsequent aging on the tensile stress-strain curve of a rimmed (low carbon) steel; (a) annealed, (b) stretched 8 pct, (c) aged at 400°F for 3 hr.

aging,[53] no agreement has been reached regarding the element or elements responsible for strain aging, as yet.

If a steel is susceptible to strain aging, all its mechanical properties and probably also all chemical and physical properties[70] are affected when strain aging occurs; and any one of numerous property changes has been selected as a criterion for strain aging.

Various steels differ primarily in two respects; (1) regarding the rate of strain aging, and (2) regarding the maximum property change occurring under any combination of coldwork, and temperature and time of aging.

The most lucid and one of the earliest observed effects of strain aging is the change of the stress-strain curve in tension, fig. 3.[5,6,15,40,41,45,49,50,71] If a steel is strained by a certain amount, its new stress-strain curve obtained by immediate testing is the almost unchanged remaining portion of the initial stress-strain curve,* without the characteristic yield point of low carbon steel. With progressive aging, however, the stress-strain curve changes further, in much the same manner as by increased coldwork. In addition, the yield point jog and yield point elongation, if eliminated by the straining, reappear after the aging has reached a certain magnitude, and then gradually increase with further progressive aging.[41,42,68]



However, the yield strength is usually reduced below the value of the initial yield strength, see figs. 3, 5, and 7.

If the coldwork is produced by rolling rather than by stretching in tension, the yield strength jog is usually eliminated by a much smaller strain (reduction in thickness) than by stretching, fig. 4. This effect of rolling is, however, highly dependent upon the roll diameter and possibly other variables of the rolling procedure.

The other strain aging effects will be discussed later, in connection with their suitability as criterion of aging.

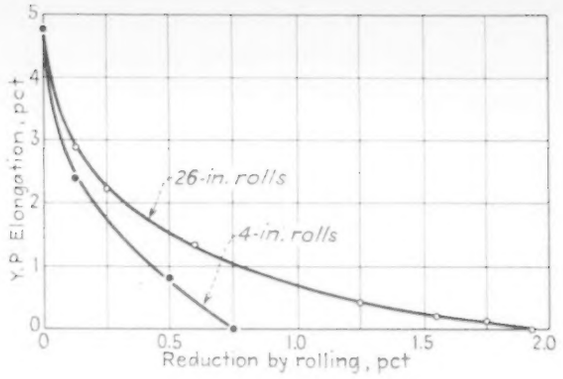


FIG. 4 - Effect of temper rolling on yield point elongation. (Hayes-Burns, 1937).

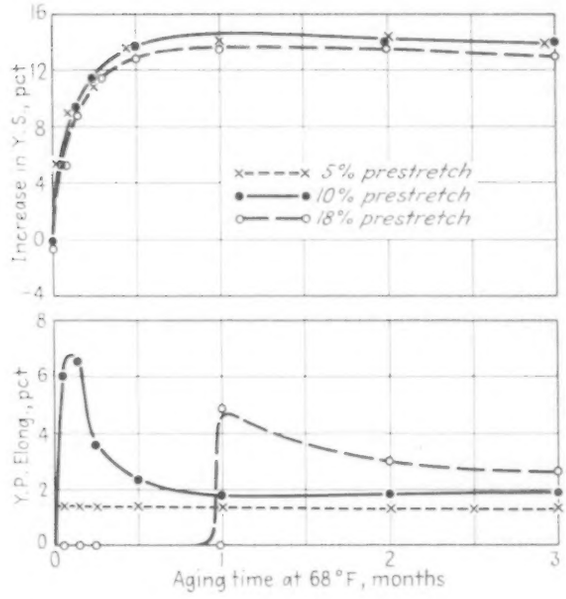


FIG. 5 - Effect of aging on yield strength and yield strength elongation of an open-hearth steel prestretched by various amounts. (Koeckritz, 1930-32).

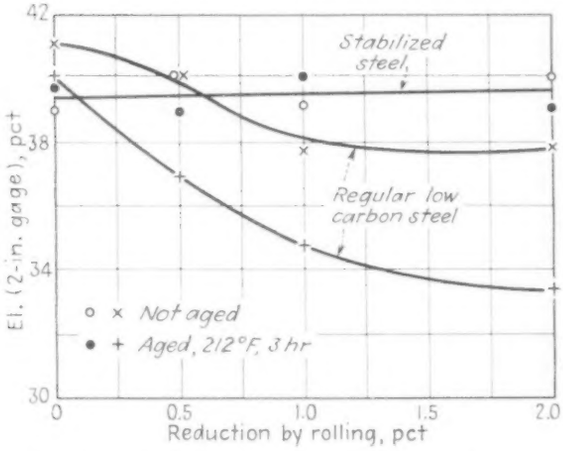


FIG. 6 - Effect of temper rolling and aging on the elongation of two low carbon steel sheets. (Hayes-Griffis, 1934).

Criteria of Strain-Aging

The various criteria suggested and used for the susceptibility of a steel to strain aging can be assembled into various groups, as follows:

(1) *a*. The direct change of strength characteristics, caused by progressive aging after coldworking, has been noted. Aging temperatures between room temperature and 550°F have been used for this purpose. The amount of coldwork has been varied from 1 to 20 pct. Varying the type of coldwork appears to have an insignificant effect.

Most frequently, tensile tests have been carried out to determine quantitatively the effect of aging;[5, 12, 18, 20, 31, 35, 40, 41, 42, 46, 61, 65, 66, 68, 71] the increase in tensile strength and yield strength, figs. 5 and 7, and the decrease in elongation, fig. 6, and sometimes contraction in area were registered. The amount of yield point elongation also has been followed up occasionally, fig. 5.[41, 42, 68] Frequently, the increase in hardness, see fig. 1, has been used as a criterion of strain aging,[14, 22, 48, 50, 54, 55, 59, 65, 66] while other mechanical characteristics have been observed only in a few instances.[27, 29, 33, 36, 53, 58, 60]

b. In abbreviated strain aging tests, generally a certain amount of coldwork and certain aging temperatures and times have been proposed, most frequently 10 pct. coldwork followed by aging at 480°F for ½ to 2 hr.

c. The reappearance of the yield point jog, after rolling by a small amount, ½ to 2 pct., has been recently proposed as a criterion for the susceptibility to strain aging of low carbon steel sheet, fig. 2.[45, 49, 50]

It has been proposed that a steel should be considered as "stabilized" or nonaging, if the smooth stress-strain curve of the cold-rolled steel does not change materially, and in particular does not develop the yield point jog after aging at room temperature for a long time, say, 1 yr., fig. 2, or at 212°F for 3 hr., fig. 7.

Apparently, no attempt has yet been made to determine whether the absence of a yield point jog in temper rolled and aged nonaging sheet is correlated with the absence of other aging effects.**

Tensile tests, in which the yield point elongation has been followed up, indicate that the reappearance of the yield point jog and yield point elongation are not related to the increase in yield strength or tensile strength, fig. 5. A material that is undergoing strain aging, as indicated by the increase in yield strength, may or may not be associated with a pronounced change in yield point.

Impact test results, discussed later, also indicate that a steel may appear nonaging if coldworked by an amount less than 10 pct., but may develop strain aging, if coldworked 10 pct. or more, see fig. 11.

(2) *a*. The property change caused by a standard aging treatment has been measured over a

***According to a private communication, tests by N. B. Pilling, research laboratory, International Nickel Co. showed clearly that the yield strength and tensile strength may have increased materially on aging before the yield point reappears.*

wide range of testing temperatures, extending anywhere between −330 and 940°F.[8,16,26,28,30,32,40-44,47,51,53] This procedure has been applied primarily to notched bar impact tests, fig. 8, machined from boiler plate. The coldwork may be produced by compression, stretching, or rolling. The aging treatment most frequently consisted of aging at 400°F for ½ to 2 hr.

The strain aging is evaluated from the differences of the impact-temperature curves for the coldworked and the aged specimens, respectively, fig. 8. As a quantitative measure of the aging effect, the shift of the transition temperature by coldwork plus aging, at which the impact energy radically decreased with decreasing temperature, has been used occasionally.[16,40,42]

Apparently, no instances have yet been reported where a steel is entirely free from such an effect of strain aging. Frequently, impact tests have been carried out only at room temperature (and higher temperatures).[4,10,12,18,19,23,25,34,38,46,52,55,56,72] The observation that aging does not reduce the impact energy at room temperature, however, does not permit any conclusion regarding the performance at low temperatures, see fig. 8.

b. Occasionally, the effect of an aging treatment on the tensile strength at elevated temperatures (blue brittleness) has been followed up.[6]

(3) *a.* The changes in strength properties observed immediately after coldworking have been considered also as criteria of strain aging. It has been claimed that a nonaging or stabilized steel is affected by coldwork considerably less than a steel susceptible to strain aging.[39,57,60,64,72]

b. A "work sensitivity" test has been proposed, based on this assumption.[57,60,64] It consists of

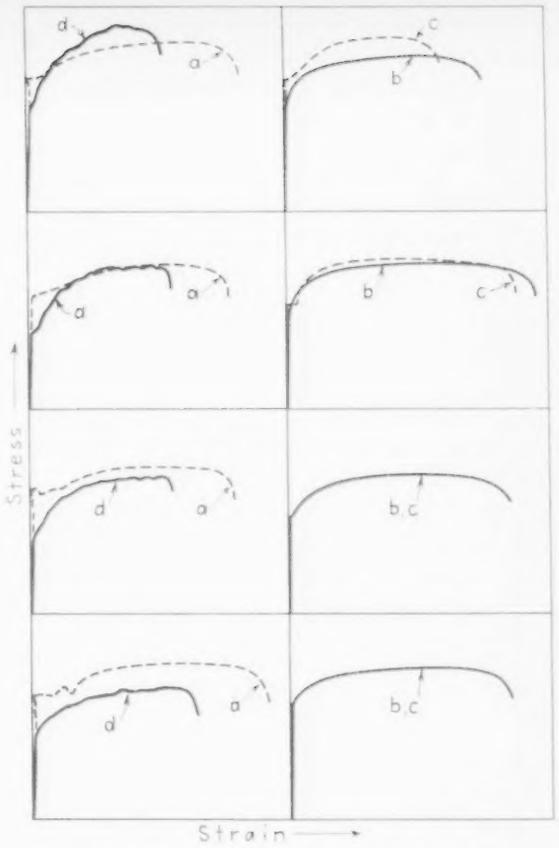


FIG. 7 - Effects of temper rolling and aging on the stress-strain curves of various low carbon steel sheets and comparison with a stress-strain curve in the range of blue brittleness; (a) annealed (b) temper rolled, (c) rolled and aged at 212°F for 3 hr, and (d) tested at 400°F. (a, b, and c represents tests made at room temperature)(Kenyon-Burns, 1934).

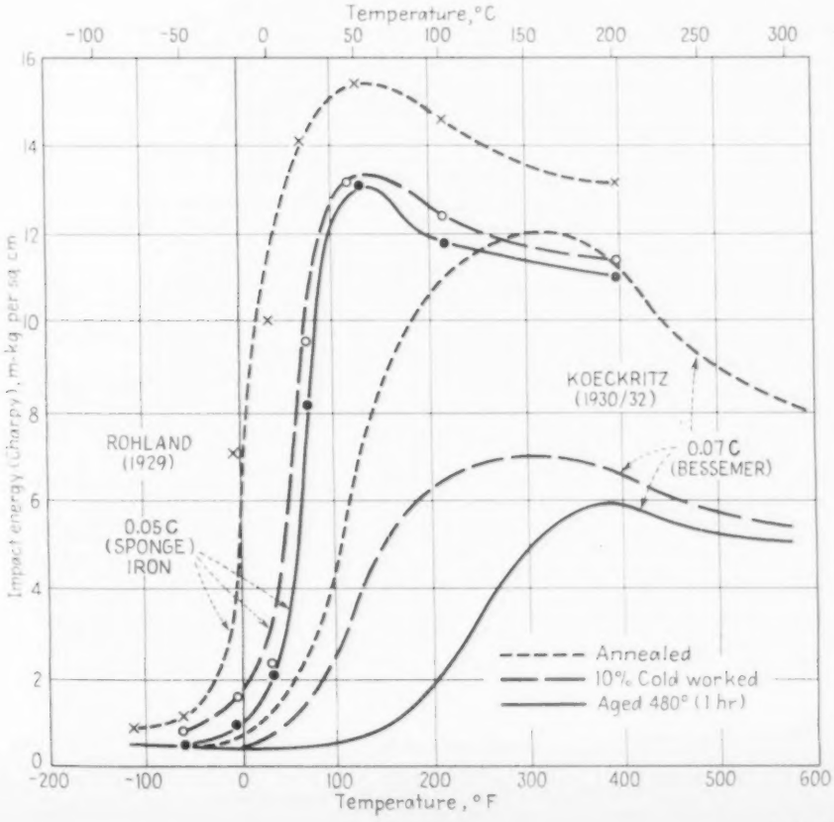


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FIG. 8 - Effect of cold work and aging on the impact temperature relations of two low carbon steels with extreme aging characteristics.

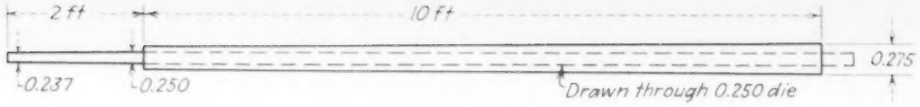

FIG. 9 - Tapered bar for the determination of the work sensitivity of a steel. (Graham-Work, 1939).

drawing a bar 10 in. long, tapering from 0.475 to 0.450 in. in diam., fig. 9, through a 0.450 in. diam. die, and making impact tests, of the Izod type, from various parts of this bar.

If a steel possesses a low work sensitivity, its notch strength was little reduced by such cold reductions, up to 10 pct., and also by subsequent aging, fig. 10. On the contrary, the notch strength of steels exhibiting a high work sensitivity suffered severely by coldwork, and still further by subsequent aging.

However, a study of a variety of steels made by different processes[72] revealed that such a simple classification does not cover all types of steel. A steel possessing a very low work sensitivity either may or may not exhibit a considerable tendency to strain aging, indicated by an additional reduction in impact strength on aging, fig. 11.

(4) *a*. The spontaneous strain aging during tensile tests at elevated temperatures has been made responsible for the maximum in strength (and minimum in elongation) which most steels exhibit on testing at temperatures between 400° and 500°F, fig. 12.[5,6,9,12,14,18,22,30,49,50,67,69]

A stabilized steel exhibits such a blue brittleness only to an insignificant extent, and it has been shown that if its strength at any elevated temperature, say, 400°F, does not exceed the room temperature strength, its stress-strain curve also will not indicate any change after aging temper rolled (1 pct. reduction) specimens at 212°F for 3 hr., see fig. 7.[49,50]

(5) *a*. On etching coldworked and aged steels with a suitable agent, the coldworked areas are made to appear darker than the undeformed portions.[7,11,16,23,24,60] However, attempts to correlate the magnitude of such "force figures" and that of a mechanical aging effect were not successful.

Conclusions

Various criteria of strain aging do not agree regarding the classification of a steel as aging or nonaging.

In a test where either the amount of coldwork, or the temperature of aging, or the temperature of testing is limited, a steel may appear nonaging, while it is revealed to be aging under other test conditions.

While truly nonaging steels have been made in the laboratory, the claim that commercial steels may be entirely nonaging has not yet been sufficiently substantiated.

The author is indebted to Mr. T. H. Wickenden, manager, International Nickel Co., for permission to publish this article.

It is also not yet known whether a steel may be nonaging in any other respect, if subjected to a strain below a certain limit, such as temper rolling by less than 2 pct. reduction in thickness.

The commercially most important differences between various low and medium carbon (straight and alloy) steels is probably their different rate of aging.

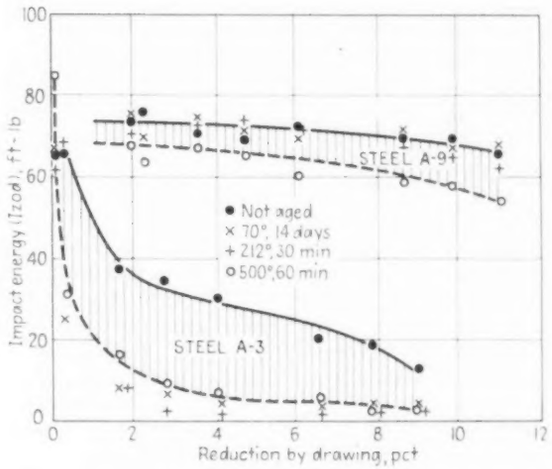

FIG. 10 - Effect of progressive cold work and aging on impact energy of two different steels. (Case, 1937).

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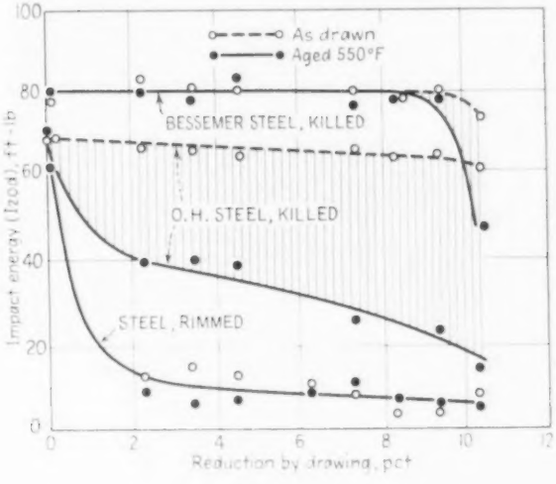

FIG. 11 - Effect of progressive cold work and aging on impact energy of three different steels. Open circles indicate steel in the as-drawn condition; solid dots indicate steel that has been aged at 550°F.

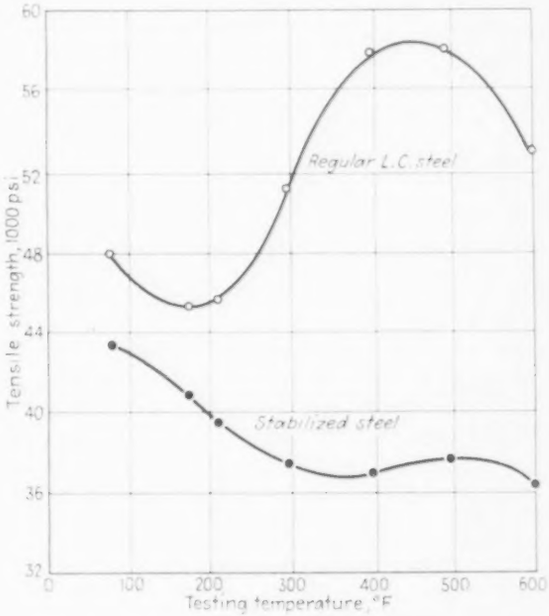

FIG. 12 - Effect of testing temperature on the tensile strength of two low carbon steels (Hayes-Griffis, 1934).

Material Handling Efficiency

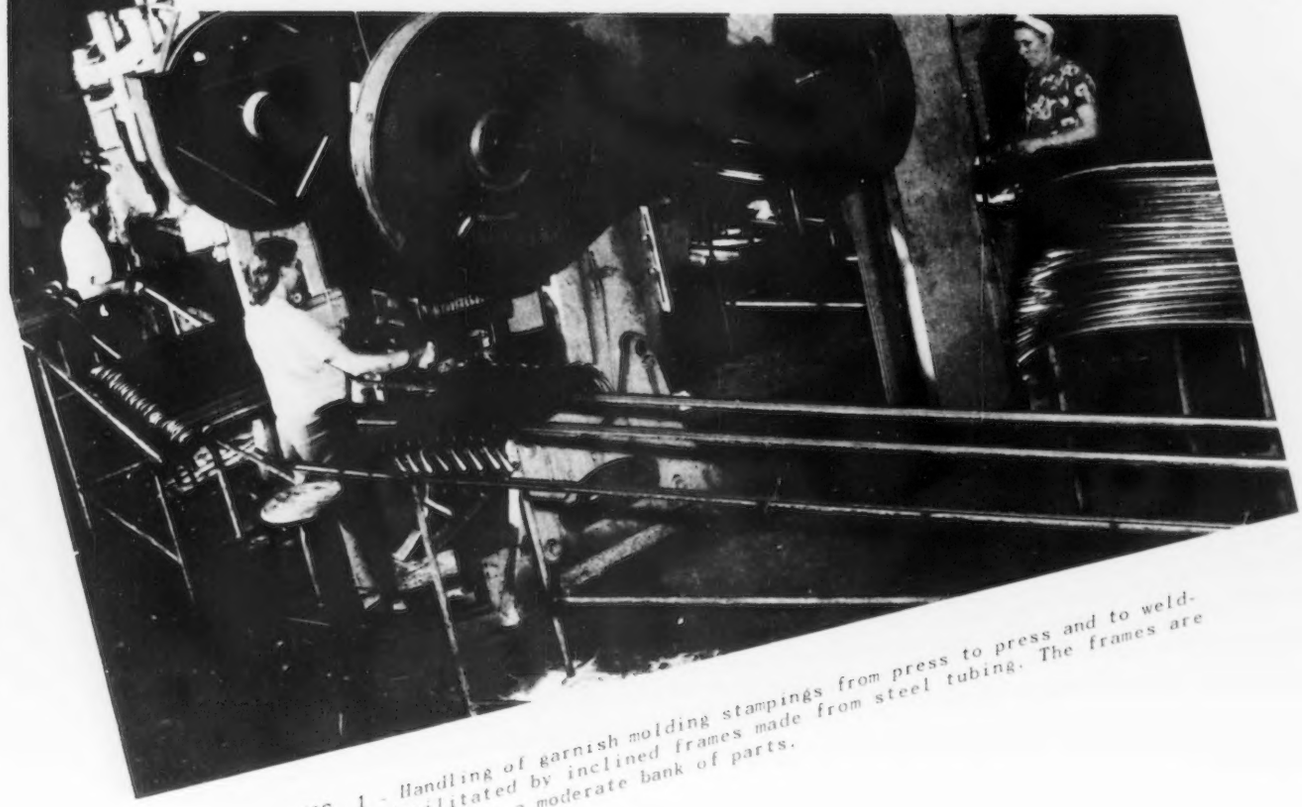

FIG. 1 - Handling of garnish molding stampings from press to press and to welders is facilitated by inclined frames made from steel tubing. The frames are designed to carry a moderate bank of parts.

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By HERBERT CHASE

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PLANS to insure maximum economy in handling materials and parts in process were carefully laid from experience gained in similar plants by the Ternstedt Div., of Fisher Body Corp., when the plant at Columbus, Ohio, was built and equipped. The plant, roughly 800 ft. square, has railroad sidings at the east and west ends and is laid out so that the general flow is from west to east with as little backtracking as optimum use of the floor space permits. Products manufactured, commonly classed as automobile body hardware, are made primarily from sheet and strip steel and are mostly of small and medium size. Items produced include window regulators, locks, hinges, garnish moldings and the like, the garnish moldings being the only bulky items.

Production volume is sufficient to warrant dividing the plant into departments that continually produce the same types of parts, but there are a great many different models so that tooling and other details of processing are changed from day to day to meet an exacting schedule of deliveries without building up large inventories. Runs are made as long as conditions permit. A warehousing section is provided for stocking some items so that reasonably economical runs can be made without too many tool changes and yet insure meeting daily

Increases Output, Cuts Costs

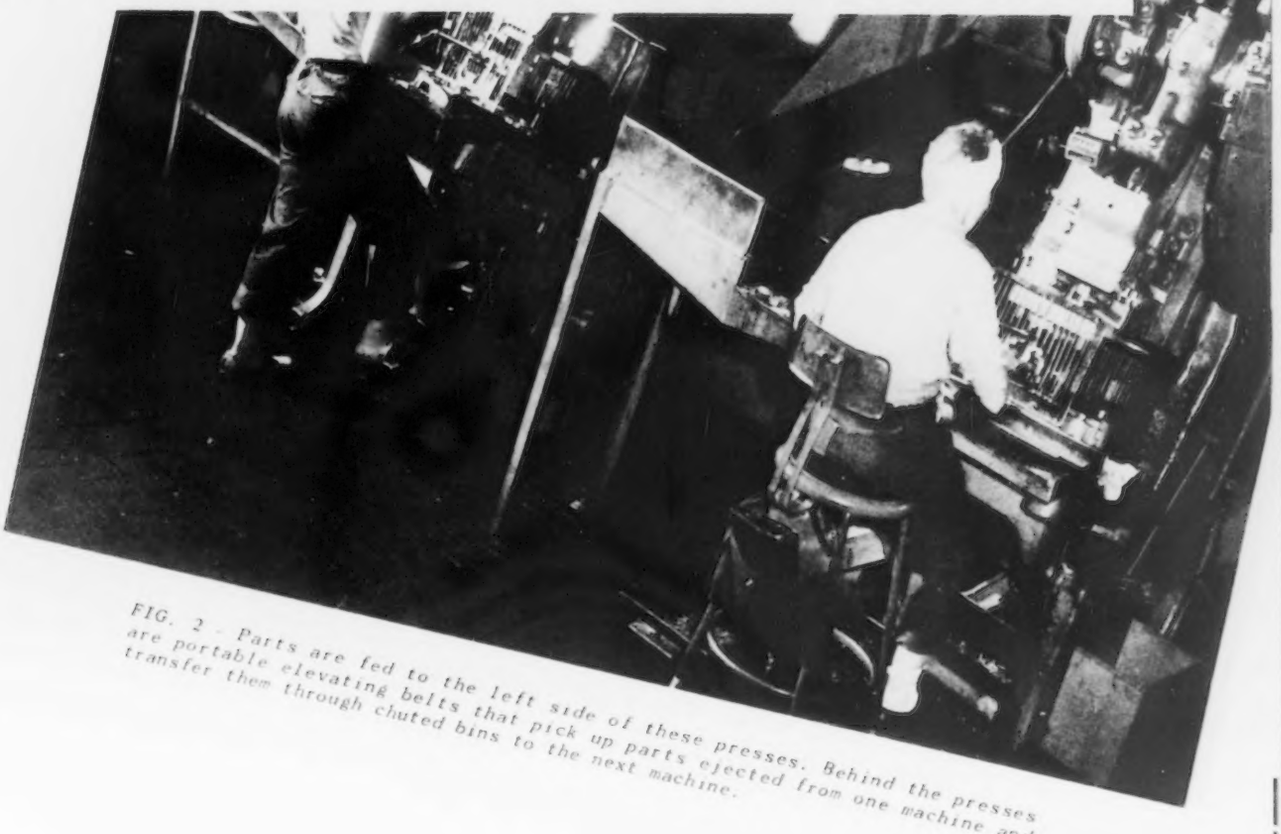


FIG. 2 - Parts are fed to the left side of these presses. Behind the presses are portable elevating belts that pick up parts ejected from one machine and transfer them through chuted bins to the next machine.

A variety of small metal parts move from machine to machine with the supply always close at hand for the operator. The combination of chutes, hoppers, elevating belts that are stationary or portable and other time serving techniques in use at Fisher Body's Ternstedt Div., Columbus, Ohio, is described in this article.

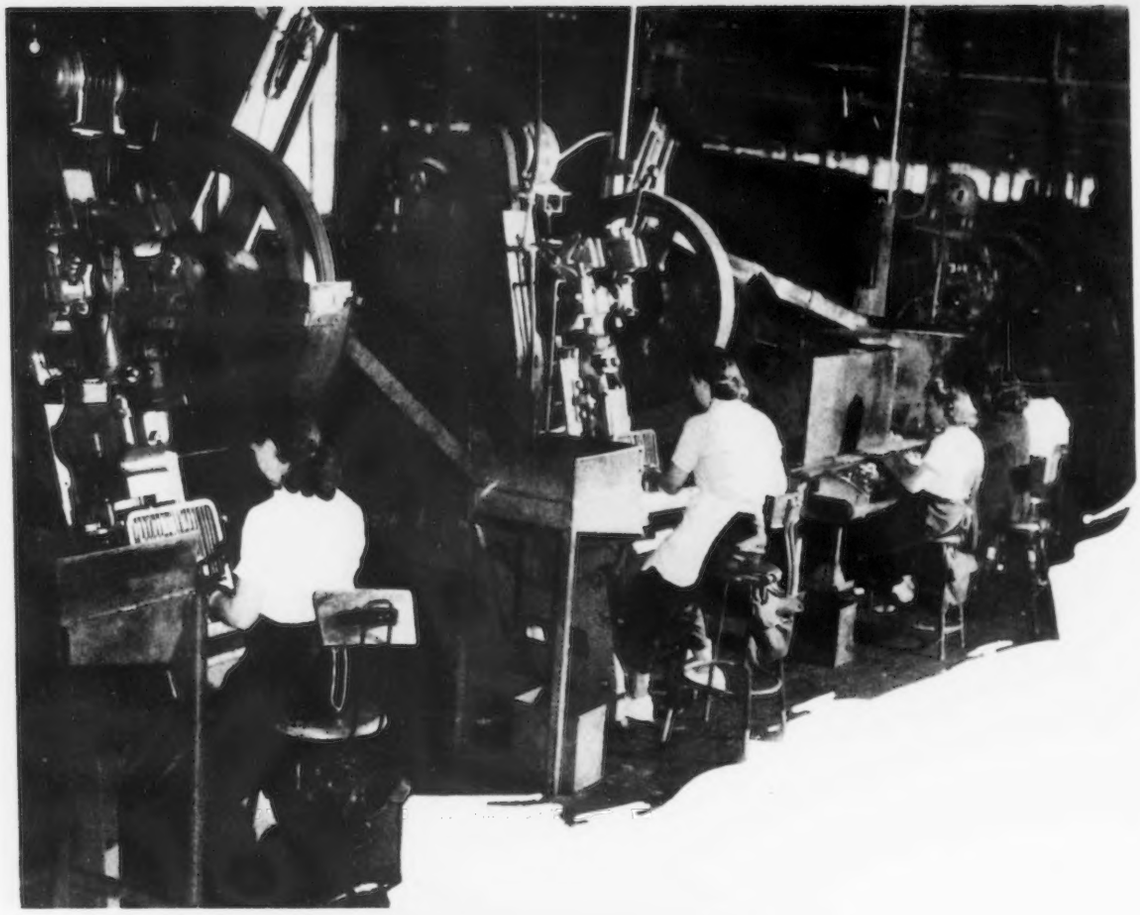
variations in shipping schedules.

Incoming cars of materials are unloaded largely by fork trucks or by a crane equipped with a magnetic lift. Some materials are shifted directly to machines but a large proportion is spotted in the storage area near the incoming siding either by fork trucks or with electric truck and trailer equipment. Bundles of steel are purchased strapped to skids to facilitate handling.

Parts such as castings and forgings, usually received in open cars, are unloaded by magnetic lift and dumped in heavy steel tote boxes fastened to channel skids to fit standard fork spacing. These loads, when delivered to processing areas, are elevated and then tilted to dump into high hopper bins arranged to deliver through chutes right at the first machine.

With this arrangement and other handling setups, machine operators and assemblers rarely have to stoop, take steps or reach far for the pieces they process or build into assemblies. This enables concentration on the mechanical operations to be performed, and, in reducing physical fatigue, worker output is increased.

Sheet and strip stock is spotted adjacent to machines using it, but where heavy coils or bundles must be handled, as onto reels or into feeding



ABOVE

FIG. 3 - Parts are delivered to this press row on elevating belts and then are transferred to hopper bins that feed the assembly track.

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LEFT

FIG. 4 - This tapping station on a lock frame line is worked right into the part delivery track. After tapping, the frames fall onto an elevating belt and are delivered into a bin across the aisle. The bin can be seen in the background.

racks, trolley hoists are provided to conserve labor and avoid heavy manual lifting.

Overhead chain conveyors handle materials in the garnish molding department for three reasons. They are convenient in shifting bulk parts, they can handle considerable banks of parts, and they can carry parts through ovens and other processing equipment. Generally this is done without manual handling except in loading and unloading of the conveyor. Most other continuous handling is done on belts, because parts are small and belts keep the work in convenient position for particular types of operations.

Many parts are produced from sheet or strip stock in presses that do fabricating and sometimes perform assembly operations, often several in series. Consequently much of the handling required is from press to press or from presses through supplementary machines. In such setups, consistent effort is made not only to effect the shift rapidly with a minimum of manual labor, but also to provide either small banks of parts between machines or space for such banks when they become necessary. The banks provide flexibility, so that the whole line need not stop if tools have to be changed or adjusted or if one or more operators are temporarily away from their stations.

Care is used to see that banks do not become excessively large, usually not over a 45-min. supply, especially where a dull or broken tool or other contingency not immediately discovered and rectified, may result in parts that do not assemble properly and so may have to be reworked or even scrapped.

One of the important objectives is to see that the piece in process is removed from the machine and sent on its way to the next machine promptly. It is equally important that the piece

FIG. 5 - This belt assembly line, supplied with parts from hopper bins, is typical of the small part assembly system in this plant.

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FIG. 6 - Locks that do not function properly at this test and packing station, located near the end of the assembly line, are dropped through the hole in the foreground of the photograph. An elevating belt returns them to a repair station.

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FIG. 7 - This dial setup spot welds glass-run channel retainers which are hand loaded in the air-clamping fixtures. After welding, parts are automatically ejected.

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be delivered to the next operator in such position that the least possible time and effort are expended in getting the piece into the next machine.

In the case of relatively large parts, such as garnish moldings, these considerations are fulfilled by sloping racks made from tubing, as shown in fig. 1. Press operators take parts from the low end of such racks, put the piece through the die in the press and then lay the piece on the high end of the next rack. The slope is gentle, advancing parts slowly by gravity or with a gentle push, and they are not scratched or otherwise marred when arriving at the next station convenient to the next operator. The racks, however, have room for a moderate bank of parts and, if necessary, an extra rack can be put in place quickly in the event that one machine becomes tied up. This avoids stopping the whole line.

Still more useful and more extensively used, however, are setups like those in figs. 2 and 3. Each press is inclined and automatically ejects the piece which slides down a chute onto a cleated elevating belt that discharges it into a hopper or bin. This bin has an inclined bottom down which the parts again slide into a tray right at the next operator's left hand, as shown in fig. 2. After the piece is processed, it is transferred to the next press in the same way.

Fig. 3 shows the next presses in this line, and beyond is an assembly setup to which the parts are delivered along with mating parts from other presses or from outside suppliers. At the first station in assembly, parts are delivered to a hopper from the adjacent press. The assemblers work beside a track along which they slide the work to successive stations, taking small parts from bins in front of the track and larger ones from hopper bins back of the track. At the end of the track is another press that rivets or stakes to complete the assembly. Thus, strip stock, delivered in coils at the start of a press line, issues at the opposite end completed and assembled to other parts.

Where it is not convenient to have all machines required in one continuous line, frequent use is made of elevated portable hoppers on casters. Parts are discharged by elevating belts into such hoppers, and when the hopper is filled it is wheeled to the machine needed next. Such hoppers have chutes that deliver the parts at convenient height for the machine operator.

Still faster assembly of more complex units, namely door locks, is done along a line of which portions are shown in figs. 4, 5 and 6. Fig. 4 shows a tapping operation on a lock frame fed from a line of machines doing various operations. A drill press operator (not shown) places the lock frame in the track aligned with the tapping fixture. The tapping machine operator (shown) slides the parts along the track, stopping each in the fixture long enough to lower the taps by pedal. As one frame moves into place, the prior one falls onto an elevating belt and discharges into a chute feeding the large hopper bin across an aisle, shown in the top background.

In the bottom of the chute are trap doors so arranged that the lock frames discharge at different points in the bin. This is because an exceptionally large bin is needed to hold a large bank of four different parts that are fed rapidly. From this bin, parts slide down an incline and are placed by hand on the assembly belt, along which they move slowly as girls add small parts in succession, fig. 5. Parts are fed to assembly stations from hopper bins, several of which are shown, and small parts are picked from compartments in a trough between the girls and the belt.

As this line runs continuously, the hopper bins are located and are filled as needed from tote boxes handled by fork trucks. These parts come either from other machines or from outside suppliers.

Further along this same line, the partly completed assemblies are carried by the belt through a press. The press forces some parts previously set into the assembly into their final position and

does some stacking in the same quick stroke. Assemblies continue along the belt while still more parts are added with hand tools to complete the assemblies.

Near the end of the belt, the assemblies are inspected visually and are turned over on the belt after which they reach stations where operating inspections are made and acceptable locks are placed in cartons for shipment. Fig. 6 shows one of three such operating inspections. There is a holding fixture at each station having two knobs and a lever engaging lock parts that the operator moves. Locks that fail to operate correctly are dropped through a hole in the foreground of fig. 6 onto an elevating belt which carries them back to a repair or adjusting bench. When repaired, locks are returned to the main belt to packing stations. Filled cartons are shifted onto a roller conveyor shown in the background of fig. 6, and later are transferred to the warehouse.

This setup is about the longest belt line in the plant, but other lines are operated in a similar manner. There are also many short assembly arrangements, including some in which welding is done on an automatic basis and in which the work is advanced by mechanical means. One such is shown in fig. 7, arranged to weld two parts of a glass-run channel retainer.

Stamped parts for this assembly are received by the operator from a chute from adjacent stamping presses. Special clamping fixtures on a table indexes the part to be welded through eight stations. The operator loads the fixture, which automatically locks by air pressure as it indexes toward the welder on the opposite side of the table. Spot welding is also automatic, the machine being tripped just after the loaded fixture stops at the welding position. At the next station, the fixture unlocks and the welded assembly is ejected automatically into an adjacent bin.

Each department of the plant has its own packing stations where parts are placed in cartons that are stacked along an aisle for pickup by truck and transfer to the warehouse area. The cartons are labeled in the warehouse and placed in racks near the shipping siding for shipment daily to body assembly plants.

Each carload must have a specified assortment of parts in numbers sufficient to meet a given schedule on a given day. Many parts vary with the type or model of body as well as with the make of car, and most body plants build bodies for two or more cars. Consequently, the shipments vary in size, and stocking and handling procedures must vary accordingly in loading trucks or trailers for transfer of loads to freight cars.

Although storage racks and pallets are varied to suit the size and type of carton they hold, most of the racks are fixed and cartons have to be unloaded by hand, one or a few at a time. Where cartons are shipped out always in large lots, they are stored in stacking racks of the type shown in fig. 8. These racks are made in sections from square tubing, each section having its own wooden floor. Each upright of these racks has a socket in its lower end or foot and a pin with a rounded end at the top end.

This makes it easy to stack the racks securely without the load resting on the cartons. It is also easy to lift off a whole loaded section with a fork truck, as in fig. 8, and carry it to the freight car. This saves unloading cartons in the warehouse and, after the section has been unloaded at the freight car, it can be returned to the warehouse or to any desired loading point.

Economies of the type outlined all contribute to the overall handling setup in this plant. Although none of them may be completely new in itself, the combined effect is significant and highly favorable to efficient plant operation.

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FIG. 8 - These sectional storage racks can be transferred as a unit. Sockets in the feet fit over pins on the top of the uprights of each rack.

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A Critical

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Brooklyn

Closeup of investment degassing in a vacuum bell jar. Violent evolution of gas from mold material occurs at a vacuum of 29 in. Hg. This operation insures a minimum amount of gas in investment with maximum casting smoothness.

ALL metals which can be melted are being investment cast except Alnico alloys. An unlimited range of alloy selection exists for the designer. It is preferable for the designer to restrict selection to an alloy in use in his investment foundry, when possible. Unnecessary or arbitrary alloy choice causes needless complexity in production and is reflected in the casting price. A listing of various alloys commonly cast in investment molds, together with pertinent data on each alloy, is given in the accompanying table.

Elimination of most machine operations, other than grinding and tapping, circumvents the need to consider machinability when selecting the metal best suited for the part. Using investment castings permits the designer to concentrate on the desired part contours without regard for machining problems. It is not usually recognized that the free-machining grades of austenitic steel lose this characteristic in the cast form. In view of this, there is no point in specifying the modified grades when planning for investment forming, when the non-modified forms will perform more satisfactorily in service.

All grades of steel are cast, although the differences in response to investment mixes, noted previously, govern the types which are most precisely formed by different foundries. As some have better results with low carbon or high chrome alloys than others, the designer must familiarize himself with the preferred metals in his particular foundry when planning a new part. The ability to obtain any alloy required allows free choice. Frequently choice is based on the raw material cost or machining response rather than the chemical or metallurgical limitations of the application. Since machining is eliminated, and as the relative cost of the raw metal in the price of the finished casting is so slight, it is sometimes actually cheaper to use high alloy chrome steels to obtain the benefit of better casting quality than it is to use a less costly metal. This of course depends upon the techniques being used in the foundry from which the casting is to be obtained.

The first part of this article, published in THE IRON AGE, May 6, 1948, discussed various methods of producing investment castings and explained many of the limitations as well as the advantages of this process.—Ed.

All special alloys are obtainable, including alloys based on cobalt, nickel and chromium, as well as exceptionally pure metals such as vacuum refined copper or pure iron. Castings for special electrical or chemical purposes are being produced in all pure base metals as well as the most complex alloys. Work is being done to produce the Alnico alloys in investment. The difficulty here lies in the tendency of the aluminum constituent to volatilize and oxidize. Use of centrifuging and induction melting under high inert gas pressure seems to be solving the problem by eliminating oxidation and suppressing the bubbling of aluminum vapor.

Small melt size has advantages as well as disadvantages. Close chemical control, which is obtainable with small melts, has led to the production of special castings of controlled composition in such common metals as gray iron. Investment cast alloy gray iron pistons, cylinder sleeves and sleeve valves for compressors is an indication of the possibility of using the investment process for production of similar parts on a major industrial scale. Improved life and freedom from service failure would offset increased raw material cost. Reduction of machining operations to finish grinds and reaming would further control any initial cost rise.

Variables Affecting Accuracy

Each production step has an effect on the final size of an investment casting. An average of

Survey of Investment Casting

An instructive explanation of the types of metals available as investment castings and the advantages and drawbacks of each features this, the second and concluding part of an extensive survey of investment casting from the designer's viewpoint. The author also includes a helpful discussion of what every design engineer should know about investment castings in order to obtain the most effective use of this process.

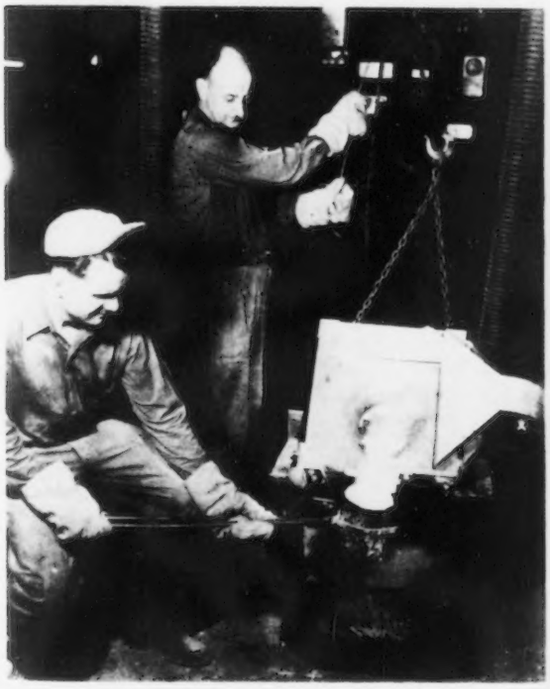
38 hand operations are needed to produce a rough casting. Over 50 operations go into the part by the time it is finished and inspected for shipment. These operations are the key to the success or failure of an application of the investment method.

Accuracy of the soft metal waxing dies varies with the exactitude of the master. Steel dies are held more closely to the desired size. Die cavities change with the temperature. Handling wear modifies soft metal dies more than steel. Metallurigcal changes in die structure must be avoided in order to prevent warpage and distortion of the cavities. The die temperature during waxing is important, as are the temperature and pressure used to force the wax into the mold. The necessity of removing the wax from the cavity and handling each wax part to clean off irregularities and add gates causes some warpage. The expansion and contraction of waxes with changes in ambient temperature is an important source of error.

It is apparent, then, that the temperature of the wax and the investment prior to solidification can destroy all other control efforts. The rate of mold heating during dewaxing modifies the degree of distortion which takes place due to wax expansion before it liquifies. Various investments have different expansion and contraction curves. The composition used must be closely controlled to insure uniformity.

The founder is also required to control metal composition and temperature. The temperature of the mold at the moment of pouring must be known and controlled. The time of solidification and time before removal of investment has an effect upon the size and structure of the castings. The cleanup operations to remove gates and undesirable metal excess are sources of scrap when

(BELOW LEFT) Tapping a 50 lb phosphor bronze heat from an Ajax induction furnace. Fume exhausters on furnace remove melt gasses and oxide smoke formed in degassing. Charcoal floats on melt and excludes air from metal. (BELOW RIGHT) Pouring a heat of 410 stainless. Use of 1/2 in. diam bars for melt charge (no shot used) plus ease of deoxidizing and adding alloys to open crucible facilitates accurate chemical control. Temperatures are closely held within 20°F. This pour was at 3050°F. All photos courtesy Arwood Precision Casting Corp., Brooklyn.



Pertinent Data on Alloys Commonly Cast in Investment Molds

Nominal Chemical and Physical Properties

Usual Alloy Name and Number	NOMINAL CHEMICAL COMPOSITION — SPECIFIED ELEMENTS ONLY																					Some Physical Properties			
	Al	Be	C	Cb	Co	Cr	Cu	Fe	Mg	Mn	Mo	N	Ni	P	Pb	S	Se	Si	Sn	V	W	Zn	Tensile, psi	Elong., Pct in 1 in. (0.252-in. diam bar)	Rockwell Hardness	Red Area, Pct
Aluminum 43	B[1]																	5					17 AC[2]	3 min.	30E	
Aluminum B195	B						4.5											2.5					32 T6	3 min.	75E	
Aluminum 356	B								0.30									7					30 T6	3 min.	75E	
Copper, electro.							99.99																			
Beryllium Copper		2			0.5		B	0.5															140 HT	10 min.	40C	
Red Brass							B								5				5			5	30 AC	20 min.	70E	
Silicon Brass							B											5				15	55 AC	15 min.	100E	
Yellow Brass							B															30	30 AC	20 min.	70E	
Aluminum Bronze	10						B	2		0.5			4										80 HT	12 min.	90B	
Manganese Bronze	1						B	1		0.5												39	55 AC	25 min.	110E	
Phosphor Bronze							B							0.2					8			4	40 AC	20 min.	75E	
Magnesium Dow C	9								B	0.13												2	32 HT	3 min.	75E	
Iron (Armco)			0.03					B																		
Steel 1020			0.2					B		0.7				0.03*[4]		0.03*		0.45					85 AC	32 Av	82B	59
Steel 4140			0.45					B		0.9	0.3			0.03*		0.03*		0.6					151 HT	12 Av	29C	30
Steel High C-Cr			1.7		0.7	13		B		0.6	0.8			0.05*		0.05*		0.4					141 HT		61C	
Stainless 302			0.15			18		B		0.7			9	0.04*		0.04*		1					76 AC	51 Av	81B	59
Stainless 304			0.07*			19		B		0.7			9	0.04*		0.04*		2*					75 AC	51 Av	80B	60
Stainless 316			0.1*			19		B		1*	2		10	0.04*		0.04*		2*					85 AC	50 Av	82B	60
Stainless 303Se			0.16*			19		B		1*			9	0.10		0.04*	0.3	2*					80 AC	50 Av	83B	50
Stainless 347			0.1*	[5]		19		B		1*			9	0.04*		0.04*		2*					80 AC	40 Av	81B	40
Stainless 410			0.15*			12		B		1*			0.8	0.04*		0.04*		2*					116 HT	12 Av	24C	36
Stainless 420			0.3			13		B		1*			0.2	0.04*		0.04*		2*					123 HT	20 Av	20C	44
Stainless 310			0.25*			25		B		2*			21	0.04*		0.03*		1.5*					63 AC	52 Av		45
Vitallium HS21			0.25		B	28					6		2										59 A[4]	7 Av	65A	12
Alloy 61 HS23			0.45		B	28							2								6		58 A	8 Av	65A	12.5
Alloy 6059 HS27			0.45		B	28					6		35										51 A	10 Av	61A	14
Alloy S590			0.4	4	20	20		35		1.6	4		20					0.65			4		66 B[5]	25 Av	20C	30
Alloy S816			0.4	4	43	20		4		0.5	4		20					0.4			4		78 A	12 Av	26C	21
Multimet			0.2*	1	20	20		B			4	0.2	20								2.5		47 A	24 Av	61A	39
Hastelloy C			0.15*			14		6			17		B							0.3	4		57 A	18 Av		15
Monel			0.15*				32	1.5		0.75			B			0.015		1.6					82 AC	35 Av	75B	
Monel H			0.1*				31	2		0.75			B			0.015		3					105 AC	15 Av	95B	
Monel S			0.1*				30	2		0.75			B			0.015		4					130 HT	3 Av	37C	
Nickel			0.5*				0.3	0.25		0.5*			97			0.015		1.5					55 AC	27 Av	67B	
Inconel			0.2*				0.2	6		0.8			B			0.01		2					45 AC	80 Av	87B	
Misco 20			0.07*			21	4	B		0.8			29	0.05*		0.05*		1.5*					70 HT	38 Av	80B	45

Foundry and Application Comments

Aluminum 43	Easy to cast; low strength aluminum for ornamental parts and low strength applications.
Aluminum B195	Difficult to cast free from shrinkage; high strength when heat treated for stressed applications.
Aluminum 356	Best foundry alloy in aluminum; high strength applications requiring maximum stability.
Copper, electro.	Difficult to cast for best density and maximum conductivity; for special electrical purposes.
Beryllium Copper	Readily cast yielding sound parts; for high strength with good conductivity and fatigue resistance.
Red Brass	The simplest brass alloy to handle; widely used for journals and low stressed machine parts.
Silicon Brass	Best casting characteristics of all copper base alloys in general use for high strength.
Yellow Brass	Difficult to cast free of dross—chiefly used for appearance to blend with other assembled parts of yellow brass.
Aluminum Bronze	Difficult to cast without oxides; used for high strength and wear resistance.
Manganese Bronze	For pressure tight high strength parts. Easier to cast than two preceding alloys.
Phosphor Bronze	Easily cast in most shapes; for moderate strength parts.
Magnesium Dow C	Readily cast in small shapes with thinnest walls; used for high strength and maximum lightness, freedom from porosity.
Iron (Armco)	Difficult to cast with highest purity; used for special electrical and magnetic properties.
Steel 1020	Readily cast in some investments, difficult in others. All grades of low carbon steel available when required.
Steel 4140	Readily cast in most investments; for high strength applications in heat treated form; other similar alloys available.
Steel High C-Cr	Cast in silica without difficulty; used for tools for minimum carbon loss and maximum hardness heat treated.
Stainless 302	Cast in most investments; used for non-magnetic properties—moderate corrosion resistance up to 1600°F in air.
Stainless 304	Difficult to control carbon; used for non-magnetic properties, maximum resistance to normal atmosphere corrosion.
Stainless 316	Easily cast; used for moderate machinability and good corrosion resistance to many commercial chemicals.
Stainless 303Se	Free machining—largely imaginary advantage due to large grains excluding Se; use 302 or 304.
Stainless 347	Used primarily where presence of Cb stabilizes during welding and in subsequent use.
Stainless 410	Readily cast—a hardenable straight chrome steel for high strength in machine uses.
Stainless 420	Readily cast—very versatile due to wide range of response to heat treatment.
Stainless 310	Used for moderate high temperature applications in aircraft. Good resistance to high temperature corrosion.
Vitallium HS21	Readily cast—used for abrasion resistance, high temperature, high strength such as turbine blades. The three modifications of Vitallium, HS 21, 23 and 27 included here are all primarily cast for aircraft use. They are very worth considering for industrial purposes requiring high abrasion resistance, resistance to corrosion, dimensional stability.
Alloy 61 HS23	
Alloy 6059 HS27	
Alloy S590	Alloys S590 and S816 are primarily used for high temperature turbine blades in aircraft. They are both good for improved resistance to high temperature errosion, particularly for some molten nonferrous metals, lead, zinc, tin, etc.
Alloy S816	
Multimet	This alloy is similar to the two foregoing and is primarily valuable for high physical properties at high temperature.
Hastelloy C	Readily cast, this alloy is primarily used for resistance to hot acids, chlorine and in oil industries reactions.
Monel	The monel grades are all castable and primarily developed for superior chemical properties. Widely used in the food processing and dairy industries, their properties are valuable in many industrial chemical applications. They sometimes are used for special electrical properties.
Monel H	
Monel S	
Nickel	Difficult to cast in sufficient purity, nickel investment castings are used in electrical and high temperature parts.
Inconel	More readily cast, Inconel is used for special electrical and magnetic purposes.
Misco 20	Readily cast, this alloy is one of the most resistant alloys to hot acids and most industrial chemicals.

NOTES: Raised numbers indicate the following conditions. [1] The letter B in a given column indicates the base metal for the alloy. [2] 000 omitted. AC—as cast, T6—solution and aged, HT—heat treated for the results shown, other treatments possible. [3] Letters indicate Rockwell Scale used. [4] A indicates tests at 1500°F. [5] B tested at 1350 F. * indicates maximum limit, where used, other figures averages. [6] Eight times carbon.

incorrectly performed. It is surprising how well controlled these many variables are to produce investment castings within ranges of tolerance now possible.

Advantages of Investment Founding

The investment casting method is the first which enables the designer to select alloys in peculiar shapes without regard of machining problems. The ability to construct complex shapes in wax by welding sub-components together before investing the part permits complicated assemblies to be formed as rigid, light units and gives the design engineer new design freedom.

The ability to produce small, intricate parts which would be expensive to machine and wasteful of metal, as well as the ability to cast quantities of such parts in unmachinable metals are the basic advantages of investment forming. Freedom from stresses and from the differences in strength occasioned by grain orientation, as in forged or rolled stock, increases the reliability of investment castings. Absence of warpage due to the annealed structure commonly produced in casting in hot investment molds further increases the value of initial accuracy by insuring permanence of size. These all contribute to simplification of design in using investment cast shapes.

The possibility of producing extremely fine detail without machining assists the designer in using less machinable metals. Combining several sub-assemblies into sturdy units results in designs unavailable otherwise. Tooling costs are very low. The dies are not expensive as they are small and most handle only hot wax. Although most machining operations are eliminated, finish grinding, reaming of cast holes and tapping threads are usually best done by machine rather than attempting to use holes, threads and final tolerances as cast. Finish can be held easily to 70 to 80 microinches.

What Design Engineers Should Know

The dimensional phase of investment founding has been highly oversold. No doubt it is advantageous to cast final shapes when possible, but this is a minor aspect of the process when the design freedom it affords is considered. Requiring unnecessarily close tolerances is one of the chief reasons investment castings are expensive. The customer pays for often unneeded skill and time to fulfill demands which are functionally unnecessary.

Designing for investment casting is different from designing for machining practices. The rules of good casting design applicable to a 100-ton engine frame are equally important to the design of a fractional ounce investment part. The investment process should not be considerd for producing forms which can be made on automatic machinery or by other casting methods, unless it is possible to simplify production and design by combining a number of units into a single part by means of investment forming. Blueprints which have arbitrary overall tolerances of a few thousandths, hangover from the common machine designing regulations, should be reconsidered and liberalized where possible.

An example of gross misapplication of investment forming, due to inadequate design of the part for the process, exists in the exhaust manifold coupling which has been so amply illustrated in other reports. Nearly all rules of design for a sound casting have been ignored. Apparently the engineer responsible merely took the drawing for a sandcasting and added a footnote reading "all tolerances not specified ±0.010 in." In this casting at least five holes should be cored. One could be used as cast in the final part. All would eliminate sources of rejected parts due to shrinkage. The neck of the coupling has at least 0.050 in. excess stock. The face of the flange has 0.125 in. excess for machining, yet inspection rejections for castings with less than 0.115 in. on the face are common. This is rediculous from two standpoints—inspection adherence to the ±0.010 in. tolerance where it is totally inapplicable and the provision for such an amount of metal to be removed. On the neck and face, stock for grinding not exceeding 0.025 in. would be adequate for the piece and, combined with the cored bolt holes, would eliminate all incorrect design factors now the source of rejections and foundry trouble. Yet, though these errors have been known for five years, it is said it would require an act of Congress to get the prints changed by the Air Force.

Physical properties of investment castings are equal to the mean between transverse and longitudinal figures prevailing in rolled bars of the same metal. Heat treatable grades respond well without warpage. The large grain size of the castings has been shown to be advantages in high temperature applications of stressed parts.

When designing for cutting tools, grinding stock must be allowed on cutting faces to remove decarburized metal. The high carbon high chrome tool steels are not noticeably decarburized, and harden to 62 Rc on the cast surface. Ability to cast complex milling cutters requiring only sharpening grinds has induced several manufacturers to install captive investment foundries for the purpose of producing tools. The economy of 100 pct scrap reclaim by remelting and recasting worn and broken tools is an added advantage. The ability to cast alloys which are 60 Rc or better as cast and which are fully annealed presents a way of producing precision gages at low cost. Investment cast blanks would require only fine grinding to finish to size and would not require hardening and involved stress relieving and stabilizing treatments.

Photographs which accompanied the first part of this report illustrate various types of problems which have been solved in investment. The number of illustrations showing low temperature alloys results from the fact that usually the most complicated shapes for machine use in normal practices are cast in such metals. High melting point alloys cannot be cast in such complicated shapes to close tolerances.

As a guide for design tolerances, high melting point metals must be provided with an average tolerance of 0.005 in. per inch. On small sections, under 0.6 in., it is commercially practical to hold 0.003 in. per in. Note that parting lines, gate stubs and similar normal casting irregularities

which show in the illustrations can be expected to appear in other parts.

Low temperature nonferrous alloys of aluminum, magnesium and copper are best for close tolerance castings. Some producers hold to an average tolerance of 0.002 in. per in. in these metals. On correctly designed parts tolerances as low at 0.001 in. per in. can be maintained on dimensions under 4 in. Adequate strength can be obtained for most normal temperature applications of complex shapes such as shown in high strength brasses or bronzes and in the heat treated grades of light alloys. Engineers have tended to design such complex shapes in low strength free machining brass due to the difficulties encountered in machining other metals. This has been the case even when compromises in serviceability have been required. It now is practical to obtain the proper materials to meet all requirements, dimensionally and metallurgically.

An example of correction of a service difficulty in a part originally designed in free machining brass, because of the complexity of the shape and difficulty of machining it in any other material, is the following. The rotary shell spacing mechanism in a popular sporting rifle was expensive to machine and too weak when it was made from yellow brass. Breakage was frequent in service. An investment casting was made in 416 stainless which proved to be accurate enough to use without machining, was less expensive and more than adequate in strength. Equally acceptable would have been castings in manganese bronze or silicon brass or a lower alloy steel. The particular methods of the foundry supplying the part were most suited to founding the stainless alloy. The wide variety of metals which could have been used to solve the problem exemplifies the flexibility of investment casting.

Tips for Designing Investment Castings

Except for providing grinding stock on surfaces to be finished and considering whether to cast or machine holes, freedom from consideration of machining restrictions is obtained by use of this process. The correct amount of finish stock varies from 0.010 in. on small parts to a maximum of 0.040 in. on large ones. Low melting nonferrous alloy castings are sometimes cast with only 0.005 in. of finish, but it is safer to allow more as a rule.

Allow liberal tolerances where possible. This reduces cost of the casting by simplifying foundry and inspection problems.

Don't overlook the functional advantage of fillets. The wax, the casting and the finished part will be stronger if sharp corners are eliminated. Designers usually run straight lines to corners because usual machining methods automatically produce sharp angles. To machine fillets is usually expensive. Even in corners which will be subsequently squared in machining, fillets should be provided to strengthen the wax model and the raw casting. Tolerances can be held much more readily. Minimum fillets should be 1 32 in. but from 1 16 in. to 1 8 in. is desired.

Holes should be cored in heavy sections when they are to appear in the final part to help minimize shrinkage difficulties. Small holes are difficult to cast in the higher temperature metals and usually cannot be cast smaller than 0.050 in. diam. In low temperature nonferrous alloys holes as small as 0.020 in. are commonly produced in small sections. In hard alloys cast holes are sometimes the only way any hole can be produced. When a hole is to be used as cast and

(Continued on Page 140)

TABLE I

Typical uses to which investment castings are being put in various industries.

AIRCRAFT: Turbine blades; carburetor and fuel-pump parts; latches; cams; brackets; jet nozzles; propeller hubs; special alloy valves.

CHEMICAL: Impellors; pipe fittings, agitator parts; reboilers; evaporators; mixers; all general chemical producing equipment uses or has application for investment castings in special alloys.

TOOL AND DIE: Milling cutters; lathe bits; precision gages; forming dies; swaging dies; stamping dies; permanent molds, etc.

OIL PRODUCTION AND REFINING: Valves; drill bits; fittings; nozzles; and applications similar to those in the chemical industries.

GENERAL INDUSTRIAL: Sewing machines; welding torches; cams; levers, spacers; cloth cutters; spray nozzles; metal pumps; dies for soap; glass molds; canning machinery parts; food processing equipment; dairy equipment; gears, gear segments; valve stem guides; electric motors; electrical controls; appliances; washing machines; pistons; alloy piston rings; pulverizing machines; compressors; clutches; etc.

SPORTING: Fishing pole guides; fishing reels; sporting rifles; cameras; range finders, binoculars;

INSTRUMENTS: Pendulums; cams; gears; actuators; compensators; calculators; printing machines; rotary presses; chronographs, chronometers; barographs; etc.

TEXTILES: Viscose spinerettes; thread guides for looms; industrial sewing machine feeders; small bobbins.

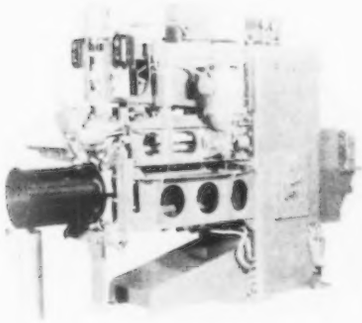
In many of these applications use of new, special alloys has eliminated long standing design problems, particularly in applications requiring abrasion or chemical corrosion resistance and in others which required extensive machining operations in weak metals. This list is far from complete, but indicates how far the investment technique has won acceptance.

New Production Ideas . . .

A cylinder forming seam welder, a welding press for assembly of large metal sections, a drawing and rolling synchronizer, metal cutting machines, a centerless internal grinder, immersion heating assemblies, a deep salt bath furnace, and a spectro-chemical analysis recording system are featured this week, together with various small tools and processing materials.

Seam Welder

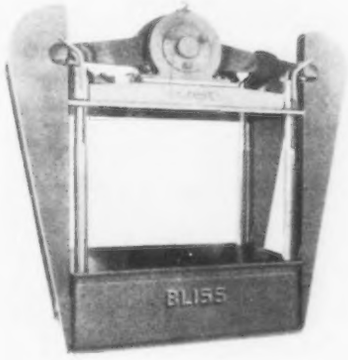
PRODUCTION of welded cylinders from flat steel at a rate of 1500 pieces per hr is claimed for an automatic cylinder forming



seam welder introduced by *Federal Machine & Welder Co.*, Warren, Ohio. Notching, roll forming and intermediate cylinder handling operations are eliminated. The welder, available in a range of sizes incorporating a forming feature, is designed to process 26 to 16 gage mild steel cylinders ranging from 11¼ in. in diameter and 14 in. long to 22 in. in diameter and 37½ in. long at production rates of 600 to 1500 per hr, depending on length of material and cylinder thickness. Sheet stock is moved into the forming rolls of the welder and automatically welded and ejected on a conveyer. An abrasive blast sheet edge cleaner with automatic transfer into welder forming rolls is available for this welder when hot rolled or rusty steel is to be fabricated. The unit is manually or automatically fed.

Welding Press

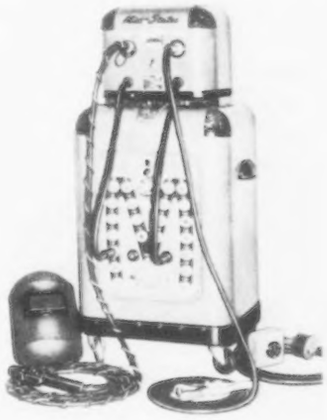
HIGH speed assembly of large metal sections and complicated assemblies which formerly required many separate operations can be performed automatically in one step on a welding press developed by *E. W. Bliss Co.*, 450 Amsterdam Ave., Detroit 2. Presses of this design are employed to assemble chassis, dashboards, body panels and similar units in the automotive industry. Units to be assembled are placed in position on the lower die or pre-loaded on conveyers, after which the press cycle is automatic. The lower die rises until it contacts the upper die, which contains welding tips placed in positions corresponding to the spots to be welded on the section. Limit



switches stop the slide in the correct position, actuate the welding, and return the slide to the lowered position when all welds are completed. Any number of welds can be made at once. This press is available in two models. The 4LU series has the driving unit in the base for plants where headroom is limited. The 4L series has the driving mechanism located on the top of the press and permits a change of stroke from 12 to 16 in. without change of parts.

AC Arc Welders

TWO new ac arc welders for industrial use have been marketed by *Mid-States Equipment Corp.*, 2429 S. Michigan Ave., Chicago 16. Of 200 and 300 amp output, these welders have an electrical circuit which will hold the welding arc constant with selective heat settings in

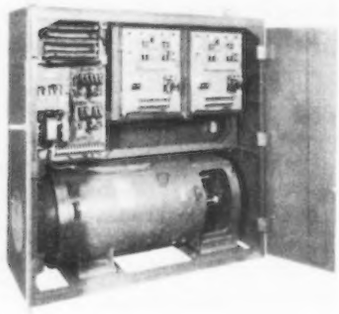


1 amp steps. This is done by means of a specicial air-cooled induction type transformer. A high frequency circuit built into the machines is claimed helpful for electronic fluxing and oxide dispersal requirements of arc processes such as the inert gas shielded arc welding method. This high frequency circuit is controlled at the electrode holder. The new models have no moving parts.

Drawing-Rolling Synchronizer

AN electronic device which synchronizes the speed of independently driven machines used in wire drawing and rolling and similar continuous process operations, has been developed by *Reliance Electric & Engineering Co.*, 1088 Ivanhoe Rd., Cleveland 10. Termed the VSS, or short stroke dancer roll control system, the unit controls motor speeds from the position of the material passing between two machines where there is a short

amount of motion to provide this control, or where the load of the controller must of necessity be small. The device is essentially a



phase shift rectifier capable of producing a variable rectified dc output voltage. The unit has been designed for 230 v dc service and a maximum current of 2.0 amp.

Polishing Lathes

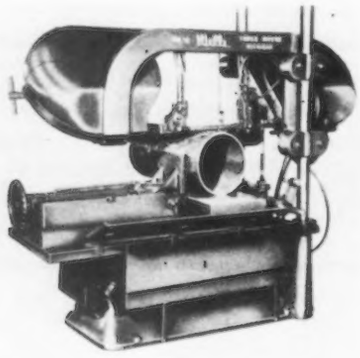
VARIABLE speed and a convenient speed selector are improvements in the type MI and MS polishing lathes, in 3, 5 and 7½ hp sizes, manufactured by *Hanson-Van Winkle-Munning Co.*, Matawan, N. J. The spindle speed, from 1800 to 3600 rpm, is governed by a variable pitch motor pulley and a single, wide V-type belt. The calibrated control moves the motor and pulley assembly which changes the drive centers, with the belt tension automatically maintained. Magnetic starters are supplied for all variable speed lathes.

Cut-Off Wheel

FOR nonferrous foundry use, a new reinforced resinoid cut-off wheel, developed by *Norton Co.*, Worcester, Mass., is said to be tough, hard to break, have long life and a fast cut. Strength and safety features have been built into the new Norflex wheel without any sacrifice of cutting quality. Sides of the wheel present a file-like surface which is said to enhance the fast cutting ability of the wheel. Norflex wheels are available in three standard diameters, 14 in., 16 in. and 20 in., and in two thicknesses, 5/32 in. and 3/16 in.

Wet Cutting Metal Saw

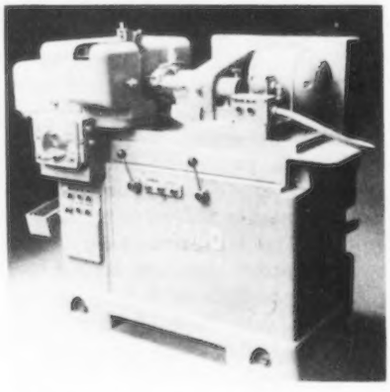
A WET cutting system has been made available to users of the Wells No. 12 heavy duty metal cutting band saw, according to *Wells Mfg. Corp.*, Three Rivers, Mich. The system is built as an integral part of the saw and includes a chip pan,



fluid tank, a centrifugal type pump-motor unit, splash guards and protective screens. The chip pan is mounted between the bed and the base. The system will hold up to 3 gal of fluid. Use of the wet cutting system is said to permit safe use of higher fpm cutting speeds and will help increase blade efficiency.

Centerless Internal Grinder

FOR work up to 4 in. diam which can be rotated on its outside diameter, the Model 181 automatic centerless type internal grinder has been announced by *Heald Machine Co.*, Worcester 6. The principle of workholding and rotation produces uniform wall thickness, perfect concentricity between ID and OD and permits reloading for multiple operations without error, it is claimed. Being fully automatic in every element of the grinding cycle including loading and unloading, these machines are suited to battery installations where one operator handles several machines. Outstanding features include controlled diminishing feed, faster cycles, automatic sizing, and quick and easy setups.



Immersion Heating Assemblies

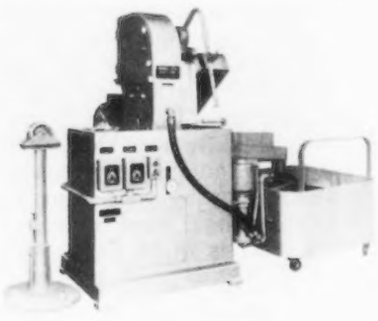
NEWLY-ENGINEERED immersion heating burner assemblies, announced by *Bryant Heater Co.*, 1020 London Rd., Cleveland 10, involve spacer cages which insure the entrainment of the required amounts of secondary combustion air in gas-firing immersed tubes for heating water, oils and other liquid solutions. The coil cages are furnished separately, or in ready-for-installation assemblies, complete with mixers and associated equipment. The atmospheric type burner comprises a gas cock, low pressure injector, flame-retaining burner nozzle, and coil cage with pilot. The blast type assemblies permit higher capacities by utilizing combustion air under pressure.

Milling Spacers

MICROMETRIC expanding milling spacers to be used in gang and straddle milling have been announced by *George Scherr Co.*, 200 Lafayette St., New York 12. They are hardened and ground throughout. Fine threads used on the spacers are guaranteed to withstand any pressure used in tightening the cutters on the milling machine arbor. With these spacers, milling cutters can be assembled to an accuracy of 0.0005 in. Spacers consist of an outer sleeve moving telescopically on a fine thread and an inner sleeve keyed to the arbor. The fine adjustment is made by turning the outer sleeve, which is graduated like a micrometer but in half thousandths of an inch.

Wet Abrasive Cutting Machine

A HAND operated wet abrasive bar cutter, Model 223, manufactured by *Andrew C. Campbell*



Div., American Chain & Cable Co., Inc., Bridgeport 2, Conn., is designed for fast, high quality cuts on practically all types of materials

up to 2-in. diam solid stock and 3½-in. diam tubing. The cutter features a 5-in. wheel flange, wheel guides, an automatic work stop, automatic coolant pump operation, and an automatic hydraulic work clamp. A separate wheel mounted coolant tank permits easy removal for chip cleaning.

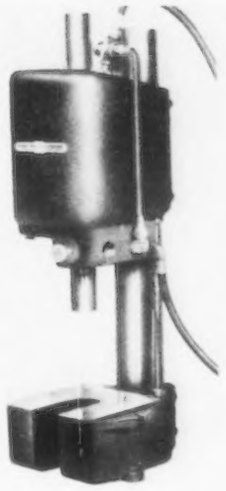
Salt Bath Furnace

FOR heating treating long parts, *Ajax Electric Co.*, Frankford Ave. at Delaware, Philadelphia 23, has developed a deep salt bath furnace which permits the work regardless of its length, to be hung vertically. This vertical loading is said to assure control over distortion, simplifies the fixtures and work-holding devices, and reduces the floor space requirements. Electrodes are inserted through the side

walls and are completely immersed in the bath. By melting a solidified bath from top to bottom, the danger of creating sealed-in pressure at the bottom while the top is still frozen is eliminated. Heating current is confined to the gap between the closely-spaced electrodes. Thus, the full depth of the furnace may be used without danger of current entering the work. Steel outer casing prevents salt leakages.

Air Impact Hammer

A BENCH type production hammer designed to produce from 1 oz to 12,000 lb impact with 100-lb line pressure has been added to the line of air-hydraulic presses manufactured by *Bryant Products Distributing Co.*, 297 W. Michigan Ave., Jackson, Mich. In operation, air under high compression is equalized on both sides of the piston and the blow effected by suddenly exhausting the air below the piston. The hammer is marketed especially for light stamping and forging, trimming, molding, crimping, coining, riveting, piercing, staking and forming in various materials. It is said to be capable



of production work on up to ¼-in. mild steel rivets. Stroke is claimed to be constant and impact pressure may be varied up to press capacity. All moving parts subject to wear are hard chromium plated. Speed of operation by hand or foot control is approximately 60 strokes per min.

Riser Compound

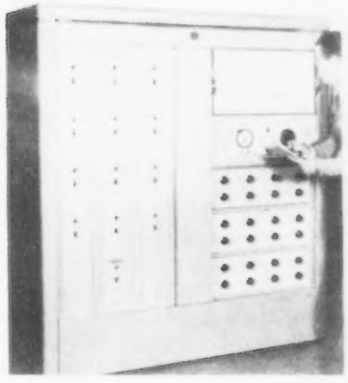
DESIGNED to reduce the waste metal in risers of castings, Risotherm has been announced by *Exomet, Inc.*, Conneaut, Ohio. Risotherm is a mixture of powders of aluminum and a metallic oxide or oxides sized and blended with alloying elements and modifying agents to give compositions desired. The use of Risotherm requires no special equipment nor changes in molding and casting methods. It is highly exothermic and its use results in the formation of molten metal and slag at a temperature in excess of 4000° F. Advantages are: Sounder castings, hotter feed metal, and prolonged riser life. Greater economy results from shorter risers, more castings poured per ladle of molten metal, less total weight and bulk to handle in cleaning castings, and less chance for hot tearing.

Cutter Blade

A NEW solid carbide cutter blade, designated the ⅜-in. Tri-Bit, has been added to the line of triangular shaped cutter blades manufactured by *Weddell Tools, Inc.*, 37 Centennial St., Rochester 11, N. Y. The cutter is designed for small shell type face mills or solid shank end mills. The triangular bit is locked into a V in the triangular shaped hole by a lock screw. Wedges are not required, and blades are adjusted with set screws. This cutter blade has been designed to permit close blade spacing with maximum chip clearance. Minimum size shell end mill is 2-in. diam, ¾-in. bore, with 10 adjustable carbide blades. Solid shank end mills are furnished in 1-in. diam and up.

Analysis Recording System

QUICK change alloy scales have been developed by *Applied Research Laboratories*, 4336 San Fernando Rd., Glendale, Calif., for use

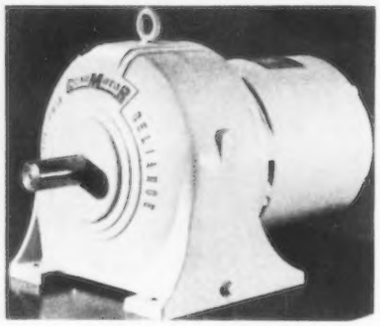


with the direct reading instrument for spectro-chemical analysis—the Quantometer—to extend its range of application. This recording system, which employs removable plastic panels fitted with direct-reading scales for each element being determined, allows panels to be made up for each type of alloy. With this arrangement the instrument can be set up for the analysis of any alloy of a certain base metal in a few minutes, the change of scales being necessary by the fact that high zinc and copper contents affect the determination of other elements. The device automatically corrects for these effects and allows accuracy on a speed analysis basis.

Speed Reducer

THE GearMotoR, a product of *Philadelphia Gear Works, Inc.*, Philadelphia 34, and *Reliance Electric & Engineering Co.*, 1088 Ivanhoe Rd., Cleveland 10, is a compact, lightweight helical gear speed re-

ducing unit, in single, double and triple reductions, providing a wide range of speeds with motor ratings from 1 to 60 hp. NEMA "D" type flange mounting has been incorporated to permit use of any type en-



closure in ac or dc motors. The motor and gear units may be separated and gears inspected without uncoupling from the driven machine. Helical gears are of alloy steel. Lubrication is from splash system with the motor greased independently and equipped with double-shielded ball bearings.

Sintered Magnet Material

A PERMANENT magnet material, sintered Alnico 5, permits the design of intricate shapes with higher external energy than has been heretofore possible. *General Electric Co.'s* Metallurgy Div., Pittsfield, Mass., has announced. The material is adaptable where small powerful magnets having high magnetic properties are required. The sintering process is said to permit economical production of small sized parts which are fine grained and not too brittle. The material has high tensile properties and can be produced with smooth surfaces and close dimensional tolerances. Sintered Alnico 5 has a residual induction of 10,000 gauss and a coercive force of 575 oersteds.

Solvent Cleaner

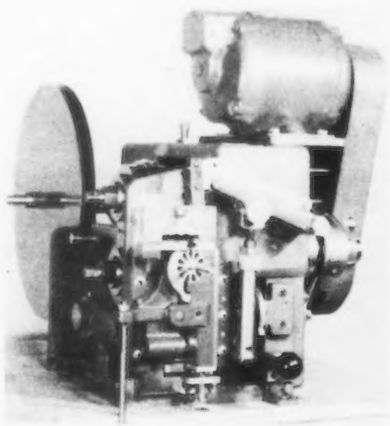
FOR cleaning metal parts in pressure spray-type washing machines, an emulsifiable solvent cleaner that dilutes with water has been announced by *Oakite Products, Inc.*, 130H Thames St., New York 6. Composition No. 97 forms water emulsions suitable for spray application in single or multi-stage metal washing machines for cleaning ferrous and nonferrous metals before electrocleaning or prepaint treatment, or between processing operations. On sheet metal and diecastings it is said to remove buffing, drawing and stamping, and cutting and grinding compounds, mill and slushing oils, rust-preventives, cutting and machining oils, metal chips and shop dirt. At recommended concentrations it shows no tendency to foam and a temporary rust-retarding film remains on the work. The water emulsions present no fire hazards and do not give off toxic vapors.

Hot Materials Handling Belt

A HOT materials conveyer belt, cushioned with rubber and strengthened with glass, has been announced by *Hewitt Rubber Div.*, Buffalo 5, N. Y. Fibreglas fabric is used in the manufacture of this belting. It is claimed this belting will not char or lose strength from heat under 350°F, and will not stretch. Up to 2½ times longer service life is claimed over other types of belts designed for this service.

Armature Insulating Machine

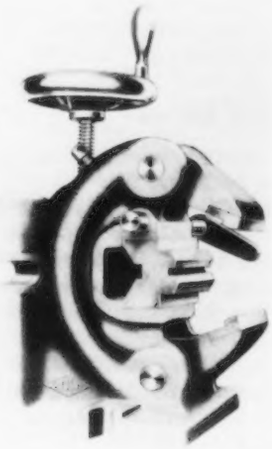
AN automatic armature slot insulating machine for forming and inserting the slot insulators has been developed by *Globe Tool & Engineering Co.*, 428 Davis Ave., Dayton 3. The machine automatically indexes the armature, inserts insulators at a rate of approximately 2 slots per sec, and automatically stops when the final slot is insulated. Insulators are inserted



through the slot opening, or where the slots require an insulation contour which would be deformed by being pressed down through the opening, they are inserted from the end of the slots. An 11-slot armature has been insulated under suitable incentive, at a rate of 450 armatures per hr, it is reported.

Self-Centering Vise

A SELF-CENTERING vise which may be mounted for both vertical and horizontal use and



holds shafts or spindles ⅜ to 3½ in. diam in 4¼-in. jaws for machining keyways, slots or splines, has been announced by *Producto Machine Co.*, Bridgeport, Conn. Accurate right and left hand thread on operating screw insures equal movement of both jaws for clamping and centering the work in hardened V-block. The vertical base is 8x5½ in.; horizontal base, 8 x 7½-in.; maximum height 13½ in.; weight 60 lb.

Production Recorder

PERMANENT records of speed and production on industrial machines are possible with the gear-driven electrically operated production recorder designated the Model R-300-H, marketed by *Electric Tachometer Corp.*, 22nd and Vine Sts., Philadelphia. This unit will show slight irregularities in speed and idle time, and provides a basis for comparing one run with another for analyzing the causes of stoppages. The recorder consists essentially of a synchronizing contactor which is driven by the machine. A motor is electrically connected to a contactor and follows its motion. The motor drives a stylus across a wax-coated chart by means of gears and feed screw. At 30 sec intervals a master clock disengages the feed screw and returns the pen arm to zero. This contact also feeds the chart at a rate of 2 iph. This cycle of operations is repeated, producing a series of parallel lines, the length of which is proportional to speed or production. The ends of the lines form a speed curve.

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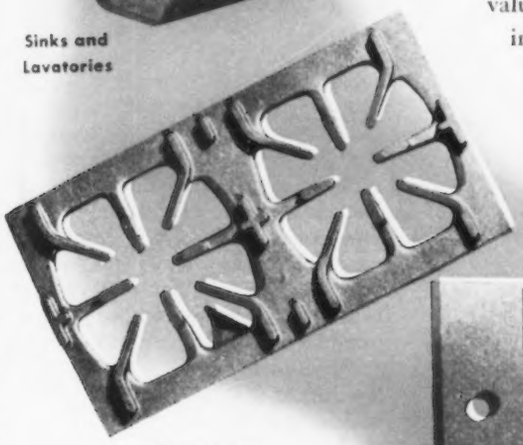
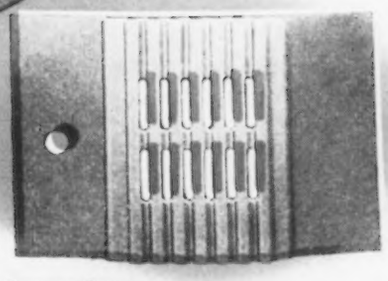


Stove Parts



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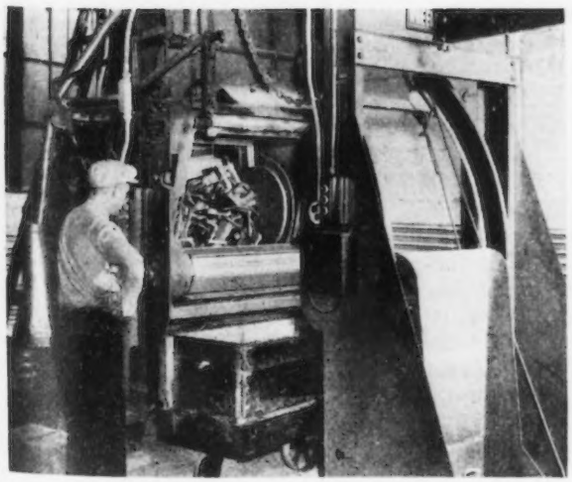

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Working first with the National Defense Advisory Commission and later as chairman of the Office of Production Management, Mr. Knudsen saw the armament program begin to roll. Because industrialists had faith in him as an individual, in many instances Mr. Knudsen was able to get programs started before contracts were actually signed with the government. Informed sources here believe it would have been impossible for any other industrialist in the country to win such quick and complete cooperation from U. S. manufacturers.

The flood of U. S. war production is familiar but it may be helpful to review some of the goals attained. Aircraft production was raised from 19,070 in 1941 to a peak of 97,369 in 1944, including 36,010 bombers. Monthly peak production figures are: Heavy bombers, 1600; aircraft engines, 24,000; small arms, 900,000; machine guns, 78,000; 75-mm guns, 2500; explosives, 290 million lb.

AFTER receiving the highest commission ever given to a civilian, Lt. Gen. Knudsen set out to make personal inspection tours of war plants as head of Army production. The inspection trip lasted more than 3 years. Mr. Knudsen visited factories in every part of the country, watched the making of weapons and talked to the workers. He flew to combat zones in the South Pacific. In 3 years he walked through 1200 factories (he never rode) and flew 250,000 miles. His aim was expressed in simple but forceful language; "I want to get all the noses pointed in the same direction."

In June 1945 Gen. Knudsen Day was celebrated in Detroit. Gen. George C. Marshall, now Secretary of State, came here for the event. Later Mr. Knudsen served as co-chairman of the Automotive Golden Jubilee and was one of 14 pioneers who received special awards for making lasting contributions to the automotive industry.

Mr. Knudsen's spectacular successes are in striking contrast to his simple, unaffected manner. Christy Borth of the Automobile Manufacturers Assn. who probably knew him as well as any member of the Detroit press, has recalled for the writer many of his personal characteristics that will surely be remembered by his associates in the industry. Mr. Knudsen always wore his hat at his desk claiming, "I can think better under a hat." Even as president of GM he usually answered his own telephone. As a rule he signed his letters, "Knudsen". Letters to intimates were signed with a "K" with a circle around it. He rarely dictated, usually writing out his letters in longhand. He was a great believer in organizing work as a method of saving time.

He held that mass production depends on a smooth flow of materials, accuracy in manufacture and good working conditions and that "Speed Up" was more a trade union catch-phrase to win the sympathy of the worker than a fact.

Mr. Knudsen could "dish it out" when the occasion demanded. Once he told the manager of a lagging war plant that his production would undoubtedly improve if he saw to it "that the crap games in the basement are eliminated."

AFTER Robert H. Jackson and Harold Ickes cited him and Alfred P. Sloan over the radio during a political campaign for having received $350,000 a year in salary and bonus, he reminded the American Newspaper Publishers Assn. that the government spokesman did not say that the government and charity got 90 pct of the amount. "As a good cash customer of the government I object to being treated that way," he snorted—"and I was probably paying for part of radio talk on top of that."

Mr. Knudsen was shot at from many angles during his stay in Washington. Most of the personal attacks he ignored. When the famous Knudsen-Hillman agency was set up some of his critics began to refer to Mr. Knudsen and Mr. Hillman, both immigrants to this country, as "The Ellis Island boys." Asked if a certain New Dealer had ever referred to them as "Ellis Island boys," he replied, "Not to our faces."

In an industry where executives are supposed to think of employees more as badge numbers than as individuals, Mr. Knudsen was a notable exception. He is generally credited with making Mr. Sloan's plan of decentralization-with-coordinated-control a workable plan for GM. Shortly after he went with Chevrolet a GM executive, obviously disturbed by the chance, called at his office. The executive had a bad attack of the jitters. Mr. Knudsen gave him time to settle down and when he failed to do so, suggested that he return to his desk and pull himself together and then come back to see him again. "But before you come back," Mr. Knudsen is reported to have said, "tell the other fellows in your department that I don't intend to bring in any outsiders to take over your jobs."

Perhaps his cryptic comment following the GM strike settlement was one of the best pieces of advice he ever gave to posterity: "Let's have peace and make automobiles."

Blaw-Knox Earnings

Pittsburgh

• • • **Blaw-Knox Co.** reports that unfilled orders climbed nearly $5 million during the first quarter of 1948 and at the close of this period amounted to $34,475,000. First quarter earnings were $784,244, or 58¢ a share compared to $773,522 for the first quarter of 1947.

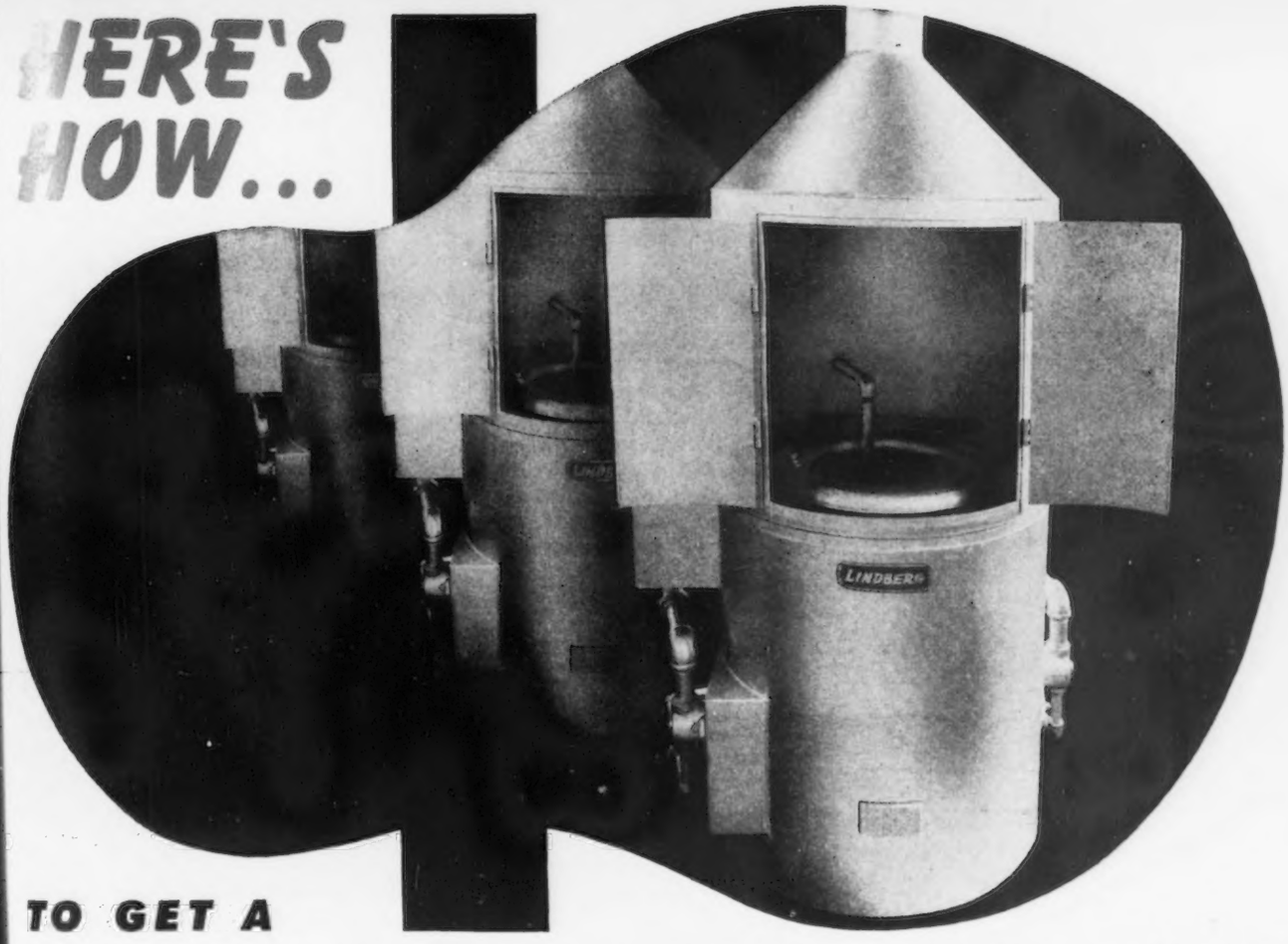
Shipments and services billed in the first quarter of this year amounted to $13,750,273 compared to $11,694,320 for the same period last year.

Coal Firm Net Rises

Pittsburgh

• • • **Pittsburgh Consolidation** Coal Co. reports consolidated profit for the first 3 months of 1948 of $3,557,645 equal to $1.68 a share on the 2,120,319 shares of common shares outstanding on Mar. 31, 1947.

HERE'S HOW...



TO GET A 1 YEAR GUARANTEE ON YOUR CYANIDE POTS

To introduce this unusual furnace we are offering to give you an unqualified guarantee for one year covering "Hi-Life" pots used with cyanide or lead (neutral salts excluded), under automatic temperature control.

Use the new Lindberg "Hi-Life" pots with the new Lindberg "Hi-Life" gas-fired Pot Furnace.

The first Lindberg "Hi-life" Pot Furnace was put in operation two years ago. With 15,000 hours of operation behind it, the original pot is still going strong. Others put into operation later have passed the 8,000 hour mark. We don't ask you to believe in miracles! So we're backing the performance records of these pots with a one year guarantee.

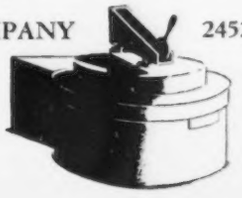
In addition to pot life two to three times the best previous figures, you also get much faster heating and greater efficiency. The new Lindberg "Hi-life" Pot Furnace is lined with Silicon Carbide and Mullite refractories assuring low maintenance in the furnace itself.

The Lindberg Engineering Company considers this new development one of the most significant improvements in furnace equipment in the past decade.

"Hi-Life" Pot Furnaces are available in these 4 standard sizes. (Note small overall dimensions)

POT SIZE		OVERALL SIZE	
24" Dia.	21" Deep	39½" Dia.	35½" Deep
20"	21"	35½"	35½"
16"	18"	31½"	32¾"
12"	18"	27½"	32¾"

LINDBERG ENGINEERING COMPANY 2452 W. Hubbard Street, Chicago 12, Illinois



LINDBERG FURNACES

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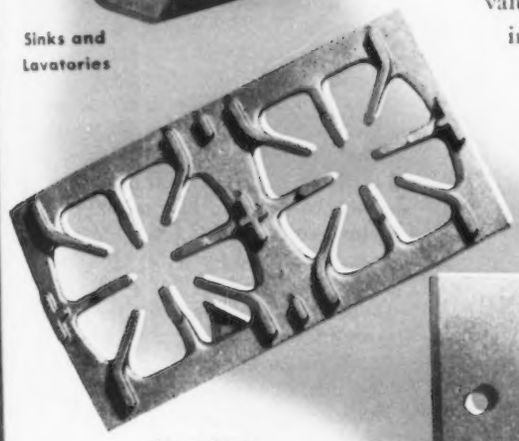

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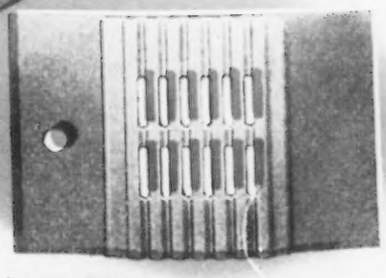

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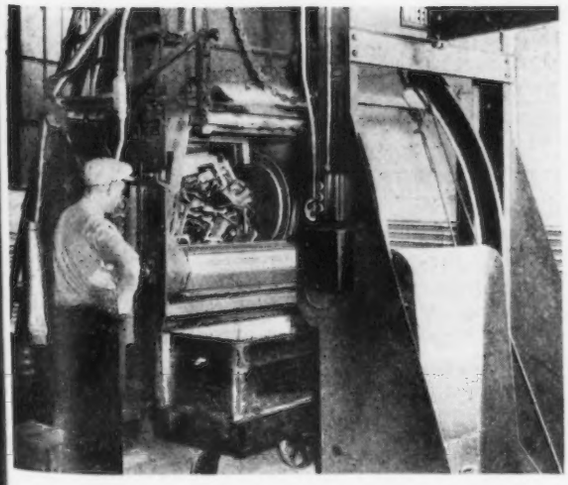

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Thoroughly familiar with war developments in Europe, Mr. Knudsen began calling early for U. S. industrial preparedness. Asked to name the three top production men in the country, Bernard Baruch had told the president, "first, Knudsen; second, Knudsen; third, Knudsen."

Within a few days Mr. Knudsen received a telephone call from the President asking him to come to Washington. GM top officials tried to persuade him to stay on at General Motors but Mr. Knudsen argued that it was his patriotic duty to go. "Besides," he said, "if I don't go it will look bad for the corporation." In accepting the government post in 1940 Mr. Knudsen gave up a $300,000 a year job.

Working first with the National Defense Advisory Commission and later as chairman of the Office of Production Management, Mr. Knudsen saw the armament program begin to roll. Because industrialists had faith in him as an individual, in many instances Mr. Knudsen was able to get programs started before contracts were actually signed with the government. Informed sources here believe it would have been impossible for any other industrialist in the country to win such quick and complete cooperation from U. S. manufacturers.

The flood of U. S. war production is familiar but it may be helpful to review some of the goals attained. Aircraft production was raised from 19,070 in 1941 to a peak of 97,369 in 1944, including 36,010 bombers. Monthly peak production figures are: Heavy bombers, 1600; aircraft engines, 24,000; small arms, 900,000; machine guns, 78,000; 75-mm guns, 2500; explosives, 290 million lb.

AFTER receiving the highest commission ever given to a civilian, Lt. Gen. Knudsen set out to make personal inspection tours of war plants as head of Army production. The inspection trip lasted more than 3 years. Mr. Knudsen visited factories in every part of the country, watched the making of weapons and talked to the workers. He flew to combat zones in the South Pacific. In 3 years he walked through 1200 factories (he never rode) and flew 250,000 miles. His aim was expressed in simple but forceful language; "I want to get all the noses pointed in the same direction."

In June 1945 Gen. Knudsen Day was celebrated in Detroit. Gen. George C. Marshall, now Secretary of State, came here for the event. Later Mr. Knudsen served as co-chairman of the Automotive Golden Jubilee and was one of 14 pioneers who received special awards for making lasting contributions to the automotive industry.

Mr. Knudsen's spectacular successes are in striking contrast to his simple, unaffected manner. Christy Borth of the Automobile Manufacturers Assn. who probably knew him as well as any member of the Detroit press, has recalled for the writer many of his personal characteristics that will surely be remembered by his associates in the industry. Mr. Knudsen always wore his hat at his desk claiming, "I can think better under a hat." Even as president of GM he usually answered his own telephone. As a rule he signed his letters, "Knudsen". Letters to intimates were signed with a "K" with a circle around it. He rarely dictated, usually writing out his letters in longhand. He was a great believer in organizing work as a method of saving time.

He held that mass production depends on a smooth flow of materials, accuracy in manufacture and good working conditions and that "Speed Up" was more a trade union catch-phrase to win the sympathy of the worker than a fact.

Mr. Knudsen could "dish it out" when the occasion demanded. Once he told the manager of a lagging war plant that his production would undoubtedly improve if he saw to it "that the crap games in the basement are eliminated."

AFTER Robert H. Jackson and Harold Ickes cited him and Alfred P. Sloan over the radio during a political campaign for having received $350,000 a year in salary and bonus, he reminded the American Newspaper Publishers Assn. that the government spokesman did not say that the government and charity got 90 pct of the amount. "As a good cash customer of the government I object to being treated that way," he snorted—"and I was probably paying for part of radio talk on top of that."

Mr. Knudsen was shot at from many angles during his stay in Washington. Most of the personal attacks he ignored. When the famous Knudsen-Hillman agency was set up some of his critics began to refer to Mr. Knudsen and Mr. Hillman, both immigrants to this country, as "The Ellis Island boys." Asked if a certain New Dealer had ever referred to them as "Ellis Island boys," he replied, "Not to our faces."

In an industry where executives are supposed to think of employees more as badge numbers than as individuals, Mr. Knudsen was a notable exception. He is generally credited with making Mr. Sloan's plan of decentralization-with-coordinated-control a workable plan for GM. Shortly after he went with Chevrolet a GM executive, obviously disturbed by the chance, called at his office. The executive had a bad attack of the jitters. Mr. Knudsen gave him time to settle down and when he failed to do so, suggested that he return to his desk and pull himself together and then come back to see him again. "But before you come back," Mr. Knudsen is reported to have said, "tell the other fellows in your department that I don't intend to bring in any outsiders to take over your jobs."

Perhaps his cryptic comment following the GM strike settlement was one of the best pieces of advice he ever gave to posterity: "Let's have peace and make automobiles."

Blaw-Knox Earnings

Pittsburgh

• • • **Blaw-Knox Co.** reports that unfilled orders climbed nearly $5 million during the first quarter of 1948 and at the close of this period amounted to $34,475,000. First quarter earnings were $784,244, or 58¢ a share compared to $773,522 for the first quarter of 1947.

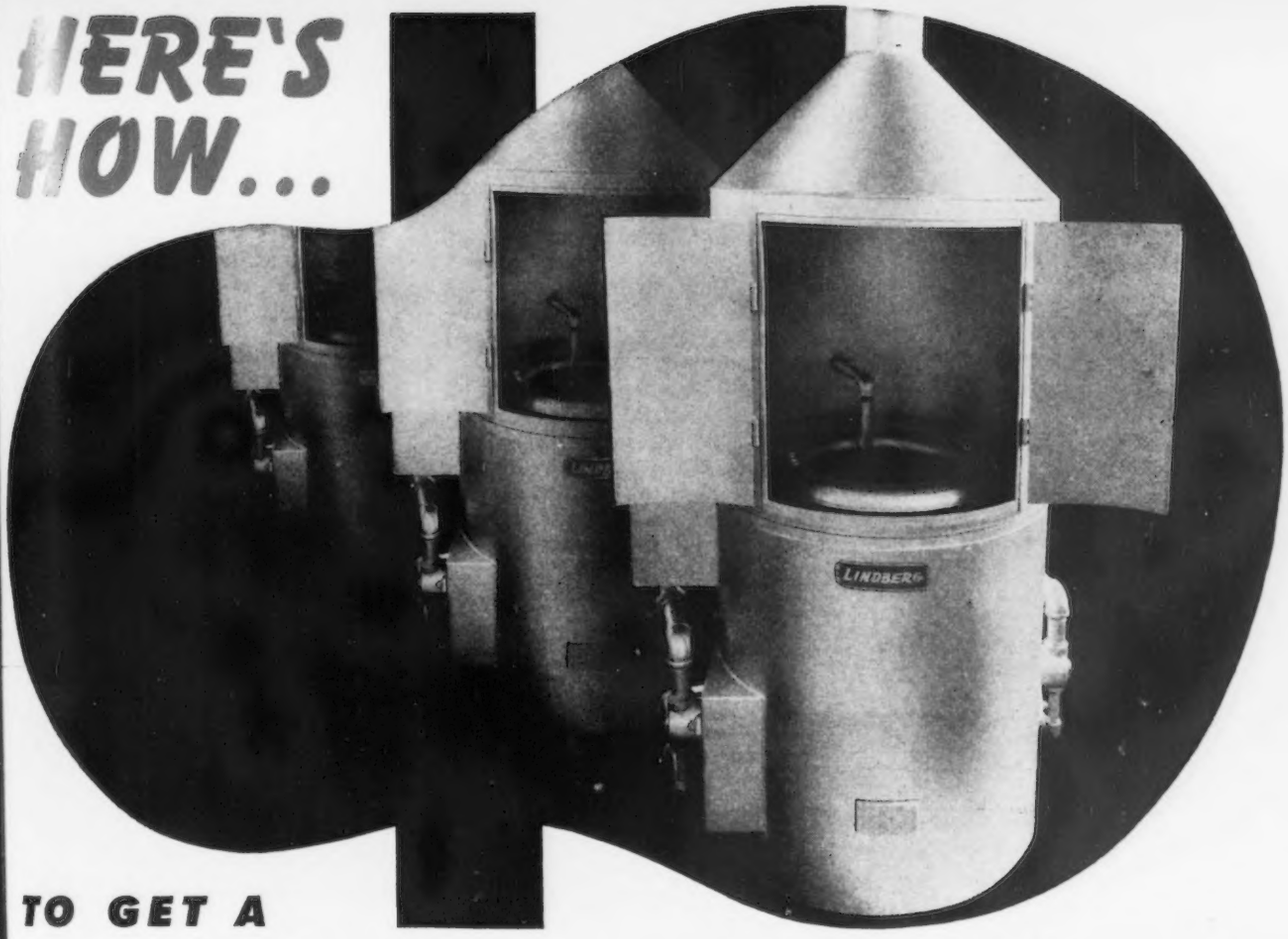
Shipments and services billed in the first quarter of this year amounted to $13,750,273 compared to $11,694,320 for the same period last year.

Coal Firm Net Rises

Pittsburgh

• • • **Pittsburgh Consolidation** Coal Co. reports consolidated profit for the first 3 months of 1948 of $3,557,645 equal to $1.68 a share on the 2,120,319 shares of common shares outstanding on Mar. 31, 1947.

HERE'S HOW...



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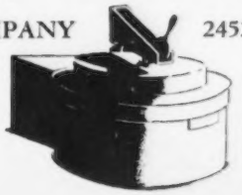
LINDBERG  **FURNACES**

Washington . . .

EUGENE J. HARDY

• Cement decision analyzed . . . Differing opinions widely held . . . FTC plans committee to explain decision . . . Congressional action expected . . . Legalizing of delivered prices not likely.

WASHINGTON — The Supreme Court decision outlawing the multiple basing point system in the cement industry has resulted in almost violent disagreement among attorneys in the Nation's Capital as to what the whole thing means to producers of steel, cigarettes, and other commodities, as well as cement.

The Federal Trade Commission still sticks to its original opinion that individual, non-systematic freight absorption has not been outlawed. Private attorneys, experienced in antitrust law and Federal Trade Commission procedures, say that in a narrow sense this may be true, but that FTC can be expected to use the decision as another step toward its ultimate goal of uniform f.o.b. mill pricing.

In any case, they claim that Justice Black's decision is ambiguous and that it can mean either that all delivered pricing methods are illegal or only that it is illegal to combine in using a basing point system.

In this regard, much hinges on the accuracy of Justice Burton's lone dissent in which he states that the majority decision did not rule on the validity of individual freight absorptio nto meet competition. Mr. Burton further pointed out that the Cement Devision "has neither reversed nor directly passed upon the principal conclusion of law reached by the court below" (the Appelate Court which ruled against FTC) so that an understanding as to what can and cannot be done is still lacking.

If Justice Burton's interpretation of the majority decision is not correct or is twisted out of shape by FTC's compliance efforts, all factory sales eventually will have to be made at a uniform f.o.b. factory price with no freight allowed or prepaid, and sales territories will be limited to the producing plant's own backyard.

ILLUSTRATIVE of the confusion over the effect of the tenuously arrived at majority decision is the fact that the Federal Trade Commission plans to establish a committee within the agency to answer queries from business concerning the effect of the decision. This committee will be similar to the one set up when the Robinson-Patman Act was passed.

What then can be done about a decision which has such potentially, far-reaching effects on the American economy? Two ways lie open to the steel and other industries—legislative changes and future interpretations by the courts.

Justice Burton's dissent makes it possible for another similar case, probably the current steel complaint, to be argued before the Supreme Court and the court will have another opportunity to clarify its stand on this important issue.

Congressional action is also likely, although not at the present session. However, any idea that Congress will legalize any price fixing system, basing point, zone, or what have you, should be dispelled for the immediate future. The steel industry's warmest friends in the Nation's Capital cannot foresee such a development, regardless of the political complexion of Congress..

Therefore, Congress is being urged to attack the problem from an oblique angle. The court's decision to bow to the commission's findings has brought about a realization that FTC has become one of the most powerful bureaus in Washington, provided adequate appropriations are made available. Emphasizing the tremendous amount of evidence compiled in the cement case, the high court placed great reliance on the commission's findings.

THIS portion of the majority opinion gives great weight to the commission's conclusions, and the courts will go slow before disturbing FTC orders in future cases. It is this portion of the decision that probably will result in legislation which would apply the "rule of reason" to all commission proceedings. One effect of such legislation would require the commission to prove that trade practices in question are unfair to the consumer and against the public interest, in addition to a pure mechanistic finding of collective action.

Such measures as H. R. 3871, now before the House Interstate and Foreign Commerce Committee, which would strip the FTC of its judicial functions are not likely to get through Congress in an election year. However, important background for eventual legislative action is being laid and private attorneys are buttonholing Congressmen with their ideas for changing the FTC act.

IN addition, the cement decision undoubtedly will stimulate more serious consideration of legislation to permit industry to police itself by means of an expanded trade practice conference program. Such legislation has been vigorously backed by Commissioner Lowell Mason, who has been extremely critical of current FTC procedures. Commissioner Mason's own bill provides for trade practice conferences where there will be a discussion by industry members and government officials as to what type of trade practice rules would define the present antitrust laws.

This bill further provides for exemption from prosecution if an industry member follows the trade practice interpretation of the law. But even in this case, if the trade practice interpretation of the law is restricted to mechanistic interpretation of what the courts have said, industry will be in no better

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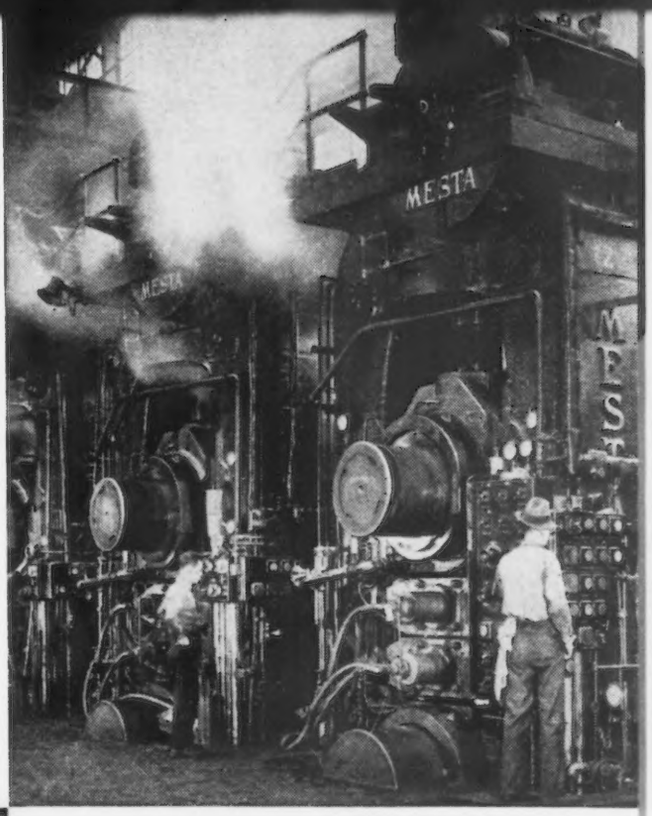

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* * *

HOW cautious can a Senator get in an election year? Consider the case of Senator Murray, D., Mont., ranking minority member of the Senate Small Business Committee and long-time crusader for additional steel capacity.

Senator Murray says now the government's interest in steel is "so great that it must establish a national policy concerning steel capacity without delay." And in an individual report filed with the Small Business Committee he calls for immediate 10,000,000 ingot ton expansion in steel-making capacity.

This expansion, Mr. Murray says, must be financed by the government if the steel industry is unwilling or unable to undertake the project.

But Mr. Murray is up for reelection this year and is giving a wide berth to such highly-controversial proposals as that outlined in his steel report. All of which leaves him in the peculiar position of demanding that the government embark upon a huge program of building and operating new steel capacity and at the same time doing nothing himself in the way of sponsoring new legislation to carry out the demands.

Actually, Senator Murray's chances of reelection are regarded in political circles as being something less than good. Still, he does not lack champions within the CIO, the railroad brotherhoods, and Dr. Dewey Anderson of the Public Affairs Institute, an organization closely identified with the brotherhood.

The following are significant excerpts from Mr. Murray's report on steel capacity:

"Shortage in the steel industry is the direct result of the failure of the industry to expand in the 1930's."

"The continued steel shortage will hamper our security, and force allocations, rationing and possibly price control on a hundred industries."

"The steel companies seem to be using the present shortage period to get into shape to squeeze out the independent, nonintegrated producers. The price increase of February 1948 on semifinished steel seems to be part of this drive."

"It is now impossible for the U. S. to achieve all its urgent goals without setting priorities and establishing allocations. This will affect many industries besides steel."

"Nowhere outside of Soviet Russia is there as strong a conviction that we are buond to have a severe depression as that held by the steel industry."

"It is not right or proper that a few companies in the steel industry should be able to affect our national life and our foreign policy so completely."

"The industry's estimates of demand in recent years have been conspicuously and dangerously incorrect."

"The addition of 10,000,000 tons of basic ingot capacity (including coke and iron resources) will amount to a charge of no more than $2.59 per ton of finished steel spread over a production of 100,000,000 ingot tons and 74,000,000 tons of finished steel in good times, and possibly only $1.73 per ton of finished steel. This might be taken out of profits, without any price increase."

"An additional 10,000,000 tons capacity can be added over a 3½-year period in such a way that the net gain in finished steel production over the 3½-year construction period would be 2,300,000 tons per year."

"If the steel companies secure Reconstruction Finance Corp. money at 3 pct, the capital charges per ton of finished steel would range between $19.40 and $23.28."

"If the government were forced to construct the additional blast furnaces and other basic equipment itself, the cost of money would be nearer 2 pct. Over a 25-year amortization period, the capital charges per ton of finished steel would range between $17.31 and $20.77."

"It is hard to find good reasons for the increase in the price of semi-finished steel in February 1948—other than that of putting the independent companies into a difficult position at some future time. It is not customary to increase already very large profits in the face of pending wage negotiations. It would be hard to argue that the profits needed to be increased beyond what they were in 1947."

All of which goes to show that Congress isn't taking Mr. Murray's "demands" very seriously.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

West Coast . . .

ROBERT T. REINHARDT

• Elimination of price differential at Geneva is enthusiastically received, but sharp pencils point out value to fabricators and buyers is largely psychological.

SAN FRANCISCO—Sober consideration of the effect of the elimination of a $3 per ton differential in the price for steel products produced by Geneva Steel Co. at Geneva, Utah, has slightly dampened the enthusiasm with which the announcement was first greeted.

Fabricators of structural and plate steel are not unappreciative of this move upon the part of the U. S. Steel Corp. and its subsidiaries to place western steel production on a parity with the East insofar as prices are concerned. However, it has been pointed out that the maximum effect of this elimination of the differential which has previously existed between Geneva and eastern producers and including the national $1 per ton cut in price, is that western users will at the most save somewhere between $1 million and $1½ million per year.

This conclusion is arrived at by assuming that the total tonnage of plates shipped into the seven western states will approximate 200,000 and that the total tonnage of structural shipped into this area will be approximately 140,000 tons. These figures are the best available for the prewar years and can be adjusted according to the optimistic views of the individual. However, it is generally conceded that deliveries of these two products into the seven western states at this time do not exceed these quantities, and of course it must be borne in mind that only a fraction of this total tonnage is produced at Geneva, Utah.

Geneva has an annual plate capacity of approximately 700,000 net tons and a structural capacity of approximately 200,000 net tons. Using these figures and assuming that all of this material was shipped into the seven western states, the total savings would of course amount to approximately $3,600,000 per year.

Another factor in the picture is the Kaiser Steel Co. at Fontana which has an annual capacity of approximately 300,000 tons of plate and 90,000 tons of structurals and thus far there has been no statement from that organization as to whether they will meet the new price of Geneva Steel Co.

In attempting to analyze the value of this price reduction to the ultimate consumer and its effect on fabricated steel, it is pointed out by several large operators that the overall effect cannot be more than a 1 or 2 pct reduction in the cost of finished work. With fabricated structural steel selling from $200 to $240 or more per ton and with steel delivered on the job at from $60 to $75 per ton it becomes apparent that a $4.00 reduction in price per ton becomes a relatively small part of the ultimate cost.

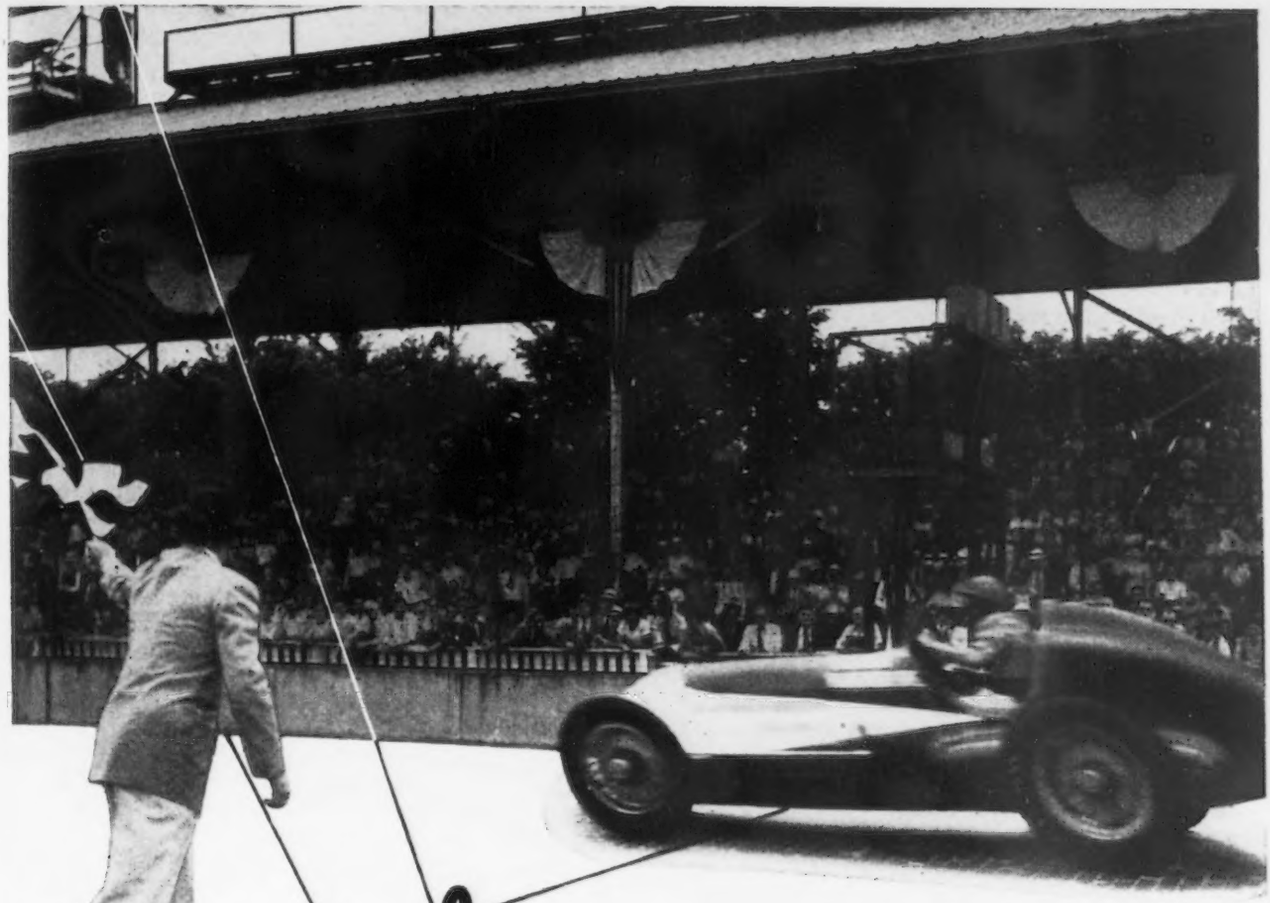
Another deterrent to unbounded joy at receipt of the price cut has been the scarcity of both plate and structurals in the area. Strangely enough, here where it was believed plate capacity was far in excess of normal peacetime demands, there is at this time a shortage of plate. Principal cause for this lack of material on the open market is believed to be the heavy assignment of plates to Consolidated Steel Corp. and other manufacturers of oil line pipe. Consensus among fabricators is that they would be much happier to pay a little more money for material and have it available. As one fabricator pointed out "a price cut on practically non-existent products is only theoretical so far as I am concerned."

THEN, too, the range of structural sizes produced at Geneva is limited and there is still considerable dependence upon eastern mills and the production at Kaiser Co. Fontana plant. Particularly tight at this time are wide flange beams, which are not manufactured in the West and which, on occasion, have held up major construction. The Moore Drydock Co. of Alameda, Calif., has been attempting to fill this gap by manufacturing wide flange beams out of plate which is welded into shape. While this is an expensive method of producing beams, it has enabled this company to carry on some work which otherwise might have been seriously delayed.

The principal effect of the elimination of this price differential has been psychological in that it has given rise to the hope that similar action may be taken at Geneva when that organization begins rolling hot coil sheets for rerolling at Pittsburg, Calif., this summer. Although the officials of Columbia Steel Co., selling agents for Geneva, have made no statement on this policy, some confidence has been expressed by steel users that the corporation would follow the same practice on this material which would have an important effect on the ultimate price of finished sheet metal products in the West.

Civic organizations have been unstinting in their praise of the action of the corporation. Kenneth T. Morris, a director of the Los Angeles Chamber of Commerce and chairman of the steel committee of the Western States Council, said on receipt of the announcement of the reduction, "this is the most important development to date in the western steel picture. This is the first time we have had a western-based steel price as low as the eastern. It should bring about a wide expansion of markets for western fabricated steel products such as pipe and tanks and will enable our structural steel builders to expand their activities all over the West.

"Undoubtedly this new price will bring even further expansion of branch plant operations here by eastern firms. Incidentally, it was



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at the suggestion of the Los Angeles Chamber and the Western States Council that the WAA wrote provisos for basing of steel prices on actual plant cost into the contract for sale of the Geneva plant. This action by the steel corporation fulfills the pledge which it made to the government and to the people of the West at the time it acquired Geneva and may be interpreted as confirmation that cost of producing steel at Geneva would be no greater than at the other major production centers.

"We of the West are anxiously awaiting the start of operations of the U. S. Steel Co.'s new continuous cold reduction mill at Pittsburg, Calif., and the construction of the new 60-in. continuous mill in the Los Angeles area. We are confident that prices established for products of these mills will reflect a low cost of semifinished material to be supplied to these mills from Geneva," Mr. Norris concluded.

James F. Bone, manager of the industrial department, Los Angeles Chamber of Commerce, said "removal of differential should bring to this area a number of new manufacturers with whom the Chamber has been working for the establishment of branch plants. In addition, our local manufacturers now find themselves in a position to expand their market area."

DWIGHT L. MERRIMAN, chairman of the Industrial Development Committee of the San Francisco Chamber of Commerce, was slightly more conservative in his comments. He said, "Western based prices for steel equal to those prevailing in the East have been the objective of westerners concerned with industrial developments for many years. Gradual reduction of the differential that has applied in the West has been an encouragement to western industry. Now the elimination of the disparity between base prices at Geneva and in the East can be interpreted in two ways. First, it should stimulate the development of industries using steel in the fabrication of their products and secondly, it demonstrates the fact that one of the most competently managed industrial groups of the world has concluded that heavy industry may be operated in the West on the basis of costs no higher than those experienced in the older established industrial centers."

The carload price made effective by the elimination of the $3.00 differential and the $1.00 per ton national price reduction, delivered within the switching limits of Geneva, Utah, are now: Carbon steel plate, $58.50 per ton as against the old price of $62.50 per ton; structural shapes $55.50 per ton as against the old price of $59.50 per ton.

Present freight rates on this material from Geneva to California points and Portland, Ore., are $11.60 per ton and to Seattle $13.00 per ton.

While it has been announced by Bethlehem Steel Co. that a price reduction is in the offing its local affiliate, Bethlehem Pacific Coast Steel Corp. has given no indication whether price adjustments on structural and plates will be made in line with the corporation's latest reduction.

SEATTLE—Feeling its way as it goes along, Vancouver Rolling Mills, Ltd., the first finished steel mill in British Columbia, is now operating with a 20,000-ton annual capacity.

The mill is located in Vancouver, B. C., and is an offspring of the Pacific Bolt Mfg. Co. for which its production for the next 4 or 5 months is earmarked, according to C. B. Hobbs, managing director.

"We should be caught up with the demands of our own program within 3 or 4 months," Mr. Hobbs stated, "and have steel for the outside market by the end of the fifth month. When this takes place we will have to be content with turning out reinforcing bars to start with. We have a 12-in. mill and will be able to roll rounds, squares, flats, channels and drivings after we know where we are standing," he added.

Operations, which began in February of this year, are on a one-shift basis because of the scarcity of skilled labor, but Mr. Hobbs reports that he expects to put on another shift soon.

One bright spot in this operation is the abundant scrap which is purchased at a controlled price of $17.00 a net ton for No. 1 and No. 2 heavy melting. Export of scrap from the area is prohibited.

The new mill was financed by its directors, the men who own Pacific Bolt Mfg. Co.: R. L. Cliff, president; Scott Keenlyside, secretary-treasurer; C. B. Hobbs and Leon J. Ladner, legal counsel. All have had many years of experience in steel fabrication and production.

SAN FRANCISCO—Pacific States Steel Corp. of Niles, Calif., has leased for 1 year with option for renewal the DPC steel foundry at Pittsburg, Calif., built and operated during the war by Columbia Steel Co. and designed originally for main frame steel castings for maritime ship construction.

Only steel ingots will be produced at Pittsburg by Pacific States Steel and heavy steel casting facilities will continue idle. Present equipment will produce from 50,000 to 60,000 tons of ingots per year and up to 250 persons will be employed. Operations are expected to start within the month. The 43-acre tract includes 18 buildings with 400,000 sq ft of floor space and the plant originally cost $8,450,000.

Steel ingots from Pittsburg will be shipped to Niles for rolling and finishing. At Niles, Pacific States Steel is now installing four open-hearths and a 26-in. rolling mill, to add larger section of channels, rounds, I-beams, structural angles and wide flange sections.

American Forge Co., an affiliate, is moving its plant from Berkeley to Niles and new forges, presses and heat treating equipment will increase its production of marine and diesel engine forgings, tool steel ring forgings, roll forged steel grinding balls, stamp mill shoes and dies, drop forgings and carbon and alloy steel forgings of all descriptions.

Joseph Eastwood Jr. is president of both companies.

LOS ANGELES—Industrial machinery manufacturers in Los Angeles County report an increase in employment of nearly 3 pct from January through March. A further 2 pct increase is expected by July, according to the Research and Statistics Div. Calif. Dept. of Employment, Los Angeles. Construction, oil well, and farm machinery manufacturers are chiefly responsible for the increase.

One manufacturer of oil field equipment reports he is now 3½ months behind production schedule, and that 80 pct of his output is slated for export to South America. Another firm in the same field reports increased activity stimulated by domestic orders.

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PERSONALS

CHARLES H. LONGFIELD, vice-president and general manager of sales, Youngstown Sheet & Tube Co.

• **Charles H. Longfield** has been named a vice-president of Youngstown Sheet & Tube Co., Youngstown, Ohio, retaining his former title as general manager of sales. He joined Youngstown Sheet & Tube as general manager of sales in 1932. At the beginning of the war he was called to an important Washington job in the Office of Production Management, steel division, remaining in various jobs there in the OPM and WPB until 1944.

• **Charles S. Traer** has been elected chairman of Acme Steel Co., Chicago, succeeding **Ralph H. Norton,** retired. **Carl J. Sharp** has succeeded Mr. Traer as president. Mr. Norton, who joined the company in 1904 and has served as chairman of the board since 1941, will remain on the board as a director. Mr. Traer has been with Acme 33 years and became president of the company in 1941. Mr. Sharp joined the company in 1927 as assistant general manager of sales and a year ago was made executive vice-president. **Chester M. MacChesney,** who has been associated with Acme for 32 years, has been named executive vice-president, and **John E. Ott,** who was elected to the board and became general manager of consumer product sales a year ago, is now a vice-president.

• **Boris M. Volynsky** has been named manager of the New York office of the Simmons Machine Tool Corp., Albany. Mr. Volynsky was manager of the Simmons office from 1934 to 1939. During the war years he was president of the Atlantic Machinery Corp. of New York.

• **H. S. Schweinsberg,** of Harbison-Walker Refractories Co., Pittsburgh, has been appointed sales manager of the Philadelphia district to succeed **C. Howard Nold,** who has retired. Mr. Schweinsberg has been associated with Harbison-Walker for more than 20 years. He was formerly assistant district sales manager at Philadelphia.

Charles H. Halford has been appointed sales manager of Harbison-Walker with his headquarters in New York. Mr. Halford served in the sales departments of both the Cleveland and Buffalo offices. He has acted as assistant export sales manager since 1947 when he was transferred to the New York office.

• **Joseph N. White** has been elected comptroller of Pittsburgh Steel Co., Pittsburgh. He joined the company in 1922. In 1936 he was made auditor and held that position until 1944, when he became assistant comptroller.

• **Edward M. Griffith** was recently appointed executive vice-president of Jessop Steel Co., Washington, Pa. Mr. Griffith has been in the steel business 45 years and prior to the war was president of the

EDWARD M. GRIFFITH, executive vice-president, Jessop Steel Co.

GEN. DONALD ARMSTRONG, president, U. S. Pipe & Foundry Co.

Defiance Pressed Steel Co., Marion, Ohio.

• **N. F. S. Russell,** president of the U. S. Pipe & Foundry Co., East Burlington, N. J., has been elected chairman of the board, and **Gen. Donald Armstrong,** executive vice-president, has been elected president. Mr. Russell relinquishes his active direction of the affairs of the company after serving 25 years as its president. Prior to coming with the company in 1947, General Armstrong was assistant chairman of the executive committee of the American Standards Assn.

• **James T. O'Connor** has been appointed manager of sales, Cleveland district sales office, Carnegie-Illinois Steel Corp. He succeeds **William S. Saylor,** who has been appointed manager of sales in Detroit. Mr. O'Connor came to U. S. Steel in 1934 as a salesman in the Pittsburgh district office of American Sheet & Tin Plate Co. He was made assistant to the Pittsburgh district manager of sales for Carnegie-Illinois in 1940 and assistant manager in 1944. Mr. Saylor has been with the company for the last 29 years. In 1944 he was made assistant manager of sales of the New York sales office and 2½ years later became manager of sales in Cleveland, the position he leaves to accept his new post. Mr. Saylor succeeds **F. C. Hardie,** who has been assigned to other duties with the company in Pittsburgh.

(CONTINUED ON PAGE 165)

Another LATROBE first!

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These intermediate high speed steels are recommended for small drills and reamers, thread chasers, taps, pipe taps, etc., wood-working knives and cutters and for body stock for carbide-tipped drills and reamers. Our sales engineers will be glad to assist you in selecting the proper grade for your particular applications.

LATROBE ELECTRIC STEEL CO., Latrobe, Pa.

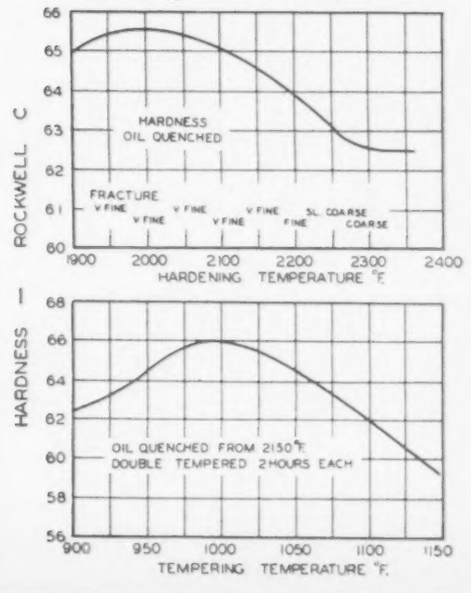
4

TYPICAL ANALYSES

		C	Cr	Mo	Va
MV-1	43¢ base	.80	4.10	4.25	1.10
MV-2	48¢ base	.88	4.10	4.25	2.00
MV-3	58¢ base	1.18	4.10	4.25	3.15
MV-4	68¢ base	1.40	4.10	4.25	4.15

Shown at right are hardening and tempering curves of MV-2 grade.

Heat Treating Data — Electrite MV-2



European Letter . .

• Representatives at Geneva conference adopt suggestions on freedom of information by American, French and British delegations . . . Russia's main aim to check criticism against herself.

Reprinted from The London Economist by special permission.—Ed.

LONDON — Public diplomacy concluded in Geneva recently one of its less unsuccessful occasions. For a month representatives of 55 nations argued and exchanged documents about freedom of information. They ended by adopting with varying majorities three conventions on separate aspects of the problem, chosen by the American, French and British delegations respectively as of outstanding importance—the first on the gathering and international transmission of news; the second on the duty to correct false news and the methods of doing so; the third on freedom of information in general. Little harm and quite a lot of good was done; yet the result of so much labor by so many officials at so much cost in hard currency hardly comes up to expectations.

The conference was held under the auspices of the Economic and Social Council of the United Nations. The spirit in which it tackled its work is expressed in the language of its first resolution on General Principles:

"Freedom of information is a fundamental right of the people, and is the touchstone of all the freedoms to which the United Nations is dedicated, without which world peace cannot well be preserved.

This is the language and the thought of the days of the Atlantic Charter and the Charter of UNO itself, when there was hope and belief that freedom would everywhere prevail as a result of war. So strong was this hope, that freedom was subdivided into fundamental liberties, for each of which an organ of the United Nations was made responsible. That is how the Economic and Social Council came to deal with freedom of the press, radio, news-reels and other "media of information." Unfortunately, the assumptions on which such hopes and definitions were based are no longer tenable. The desire of all governments to cooperate in the observance of certain principles does not exist; the political and moral terms they use have been given diametrically opposed meanings; the rulers of half Europe will not and dare not concede liberties which the rulers of the other half regard as fundamental. To the Russians at Geneva freedom of the press meant its control by the representatives of the people—that is to say the government. To the vast majority of delegates it meant exactly the opposite.

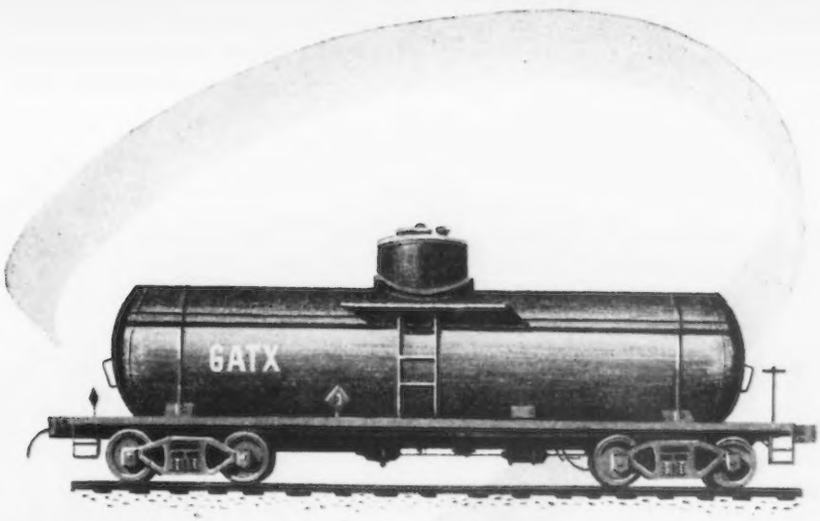
WHAT then was to be achieved by reviving out-dated assumptions and aspirations before a conference so deeply divided from the very start? One of two things. The non-Communists could close their ranks, agree to disagree with the Communists and produce a resounding and general declaration of principles to which Russia and its satellites would refuse to subscribe. Or they could try to draft workable conventions on such matters as the handling of news, the treatment of correspondents and the correction of untruths and half-truths, which might secure some slight measure of observance in Communist countries and might set up uniform standards and practice in non-Communist countries. The conference chose to follow the latter course, well aware that the non-Communist delegations would disagree strongly among themselves by the way—causing delay if not deadlock.

THE disagreements in the camp of the free countries were full of interest. Russians seemed to want above all to check that criticism and reporting about themselves and their allies which they denounce as incitement to war, and which they attribute to the fact that the press in capitalist countries is beyond government control. The British stood stoutly for free trade in ideas, the running of risks and the simple formulation "when *Pravda* is wrong who corrects *Pravda?*"

The Americans, who put all their weight behind the convention on the gathering and international transmission of news, were chiefly interested in the rights of foreign correspondents. The French, very appropriately, put all their weight behind one or two simple ideas, embodied in the convention "concerning the institution of an international right of correction." They dropped, in the course of debate, a proposal for press cards which would have created a class of professional *journalistes toleres;* but they secured a majority for a far-reaching proposal which—if it comes into force—will create quite novel problems for news departments of foreign offices, news editors and compilers of radio bulletins. In Article 1 of their convention a procedure for the correction of "false and distorted reports" is laid down.

It would be unfair to submit all these draft conventions to the same test of practicability.

In any case the three conventions adopted in Geneva have still some way to go before they have to be signed by governments. For the time being it will be wise to treat the draft conventions produced by the conference firstly as bodies of doctrine, in which can be found useful definitions of many points in the democratic case which have been vague or misleading; secondly, as definitions of aim which may make it possible for regional groups of governments at a later date to make freedom of information a reality among themselves.



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Industrial News Summary...

- ***Steel Prices Now "Unsystematic"***
- ***Consumers Confused by Variations***
- ***Industry Faces Coal Tieup in July***

IF the Federal Trade Commission wanted an unsystematic, catch-as-catch-can and thoroughly "out of this world" pricing practice in the steel industry it has it this week. Any steel consumer will vouch for that. Whether or not this multiple, unprecedented pricing "system" will stand when demand drops below supply remains to be seen. But it is here now—and with a vengeance.

Most large steel firms have met the U. S. Corp.'s price-cutting move—on a total basis. But the cuts have not been the same on all products. Some firms made no reductions on some items the Corporation reduced, others slashed their prices by a lesser amount while one company made deeper cuts on a few items—the latter was an exception.

The steel user this week should be confused—and he is. But in the long run if the reductions remain in effect he will benefit. He will not always be able to tell what his total steel costs will be ahead of time. It depends on where he gets his steel.

No longer can the steel consumer be sure how much his bars, sheets, plates and strip will cost. If he gets them from U. S. Steel and some of the larger steelmakers they will cost less than a month ago. But if he gets his steel from smaller firms his prices may be unchanged.

This week steelmaking costs are quite varied in the industry. Some firms are close to the red or at least are not showing much profit on major items. This was indicated when some steel sales officials refused to make deep price cuts on such items as sheets and strip. The U. S. Steel price reductions were a surprise within and without the industry. Early this week a few major steel makers were still scanning their costs to see what kind of a competitive condition they faced.

ON top of the new steel price picture is the railroad freight rate increase which might kill or at least maim the goose with the golden egg—as far as steel haulage is concerned. There is a chance that the railroads will never get the full benefit of the freight increase in steel products. Already trucking firms and barge lines are preparing to do a land office business on steel shipments when steel firms and steel consumers study ways and means to side track the railroads on many shipments.

Because the freight rate increases last week put the kibosh on some remaining freight absorption sales by steel firms—just as the two previous raises did—some steel users will be left out in the cold. For this they can blame the FTC and the railroads. Perhaps they can benefit by barge and truck shipment. That is what some of their previous steel suppliers are trying to figure out.

Steel making costs are high. The FTC is trying to force the industry on an f.o.b. mill basis even before the present steel pricing case is settled. Because of this, there is little chance that steel firms will go far out of their backyard to sell steel—at least under present market conditions.

The price cuts by steel companies have not yet received the attention and cooperation they deserve. That is the opinion of top steel officials. It will take more than mere platitudes to make the experiment work. So far the industry has not even had platitudes from its government.

The "tongue in cheek" attitude with which the steel price cutting move has been received in some governmental and industrial circles has left steel officials aghast. Had the industry been overproducing and had there been price cutting among various makers because of order-scarcity, the price cutting move could be classified as normal. But this was not the case.

IT was quite clear this week that the money which some steel people will forego to meet the U. S. Steel anti-inflation experiment was actually pried out of their pocketbooks. If the move does not pay dividends by way of lower prices on finished goods and a halt in the rise of raw material costs some steel firms won't be able to stand the gaff and will have to withdraw their steel price reductions.

The steel supply outlook is not a happy one for the consumer this week. Happy predictions that the industry will better last year's performance of 85 million tons of ingots can not be made this week. They can not be made, if at all, until the threat of another coal strike in July has been estimated.

The coal strike of a month ago cost the industry more than 1.5 million tons of ingots. Another coal strike of similar length will cost more than that. No steel company has any coal to spare at the moment—nor will they have by the end of June. If the industry gets by without another coal stoppage there is a chance that more than 85 million tons of steel will be made this year but it is a shaky "if."

Just as it is unsafe to predict total steel output this year under present circumstances, so is it impossible to be certain that steel will not face directives and controls after the election. The voluntary allocation program may work. It may not if the Marshall Plan needs become greater and the defense program takes more than expected—either of which would not be surprising.

Steel scrap markets were straining at the bit this week but pressure for the same or lower prices by consumers was keeping most prices unchanged. The exception was at Philadelphia where No. 1 steel was up an average of 75¢ a ton. This raised THE IRON AGE scrap composite 24¢ a gross ton to $40.63 a ton.

The steel ingot rate this week is 94 pct of rated capacity, up 3 points from last week's revised rate of 91 pct. It is slow going for the industry to reach its prestrike level of 97.5 pct.

• **STEEL PRICES**—Steel prices this week are more numerous than the new population of a rabbit hutch. First there are different prices on many products established by major steel producers—as a result of the price cutting move. Then there are higher prices charged by smaller companies whose raw material costs and steelmaking expenses require a premium quotation. Next come warehouse prices which are the direct result of the different mill prices. After that there are brokers who charge whatever they can buy for, plus a commission, then there are charges resulting from conversion plans. In the final and last resort catagory are the gray market prices which vary all over the map. No wonder the song "I Am My Own Grampa" sounds perfectly logical to steel buyers.

• **J & L PRICE CUTS**—Jones and Laughlin Steel Corp. price slashes which became effective May 6 will save customers about $3,500,000, according to company officials. Products affected and the amount of the decrease a ton are: Skelp $1, floor plates $3, cold finished bars $2, cold rolled strip and sheet $1, nails and staples $3, woven wire fence $3, barbed wire $2, annealed and galvanized fence wire $2, hollowware enameling black plate $2, tin plate and can making black plate, 10¢ a base box, buttweld pipe $2, wire rope 8½ pct on preformed only, otiscoloy and jalloy $2. The corporation also said that the price of steel drums would be reduced, but did not name the amount.

• **WHEELING REDUCTIONS**—Wheeling Steep Corp. has reduced its prices on tin plate, buttweld pipe and cut nails. Although the effective date of the cuts was not announced, some of the reductions are expected to appear on bills dated after May 1. The tin plate reduction amounts to $2 a ton; that on nails $3 a ton, and pipe $2 a ton.

• **BIG VOICE**—A House Armed Services Subcommittee last week demanded a full-fledged investigation of the steel industry with regard to national defense needs. At the same time, the subcommittee, headed by Rep. Short, R., Mo., declared that unless "adequate" steel supplies can be made available to the oil industry within the next 6 months, Congress must set up a compulsory allocation program. The Short subcommittee has been studying the oil shortage since January.

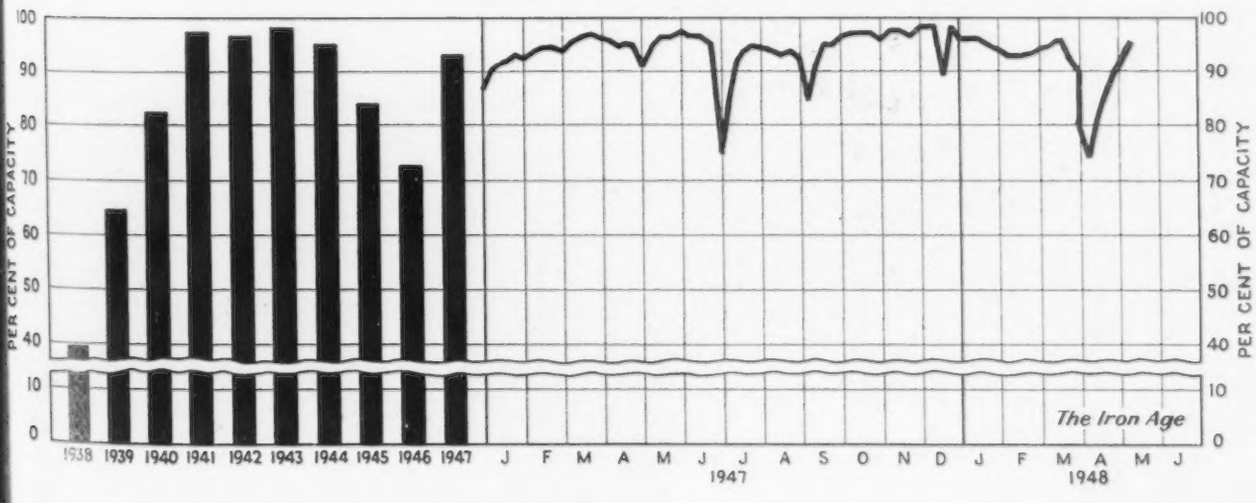
NEW TRREAT—Steelmakers, who, after a month-long uphill struggle to pull the ingot rate back to its precoal strike level, were on the verge of taking a bow, were brought face to face with a new threat which could send the rate plummeting to new lows. The continued failure of railroads and unions to agree was no less a threat of steelmaking than to any other industry that depends on the railroads for the materials which are its life blood. Consensus within the industry was that the railroads would be kept running, either by agreement, or by government mandate. But that was slight solace to harried producers, who once more saw factors outside their control threatening to stymie production efforts.

• **UNFINISHED BUSINESS**—Reports that the demand of the steelworkers' union for a social security package is a current one are misleading. That negotiation is unfinished business brought over from the contract of April 1947. Both sides have been meeting on that problem for months on end and a solution is in sight but not yet completed. The final stages just happened to come about when the recent wage demand was turned down. There will be no action on pensions until next year because provision was not made for any reopening except on wage rates.

• **SCRAP SCRAP**—In the absence of export controls on scrap from the United States to Canada, considerable scrap has been going into Canada, mostly from the Buffalo area, accompanied by loud complaints from U. S. firms. As a result of some pressure from our government, the Canadians have notified their dealers to stop taking scrap out of the Buffalo area. This should ease the situation, according to Commerce Dept. officials, who have been following developments.

• **FREIGHT CARS**—Freight car deliveries during April totaled 9052, according to the American Railway Car Institute. "Despite continuing material shortages, a production rate above 9000 has been maintained during the past 5 months," the Institute pointed out. The production goal on freight cars is 10,000 per month. New car orders during April totaled 18,252, the highest month since 1941. Of the cars delivered, 6726 were built by the car builders and 2326 were from railroad shops.

Steel Ingot Production by Districts and Per Cent of Capacity



...k of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
.....	98.5	87.0	85.0	90.0	95.0*	90.0*	90.5*	95.0	102.0	76.0	93.0	89.5	105.0	91.0*
.....	99.5	93.0	92.0	90.0	94.0	93.0	100.0	98.0	102.0	85.0	96.5	89.5	105.0	94.0**

...ind ...ative

New Bliss Presses for Nash Bodies

Bliss presses are rugged production equipment, easy to install, adjust and repair. That's why they're favored at Nash's Milwaukee body plant, as they have been ever since Nash first started building cars...why they predominate on practically every one of its stamping set-ups.

The majority of the presses in the Nash Body Plant *are Bliss-Built*. They range from a three-ton capacity bench press for riveting small sections to a battery of 500-ton fully enclosed presses recently installed for the production of side quarter panels.

You'll find similar case histories wherever you look in the automotive industry—in fact, *every* industry that depends upon pressed-metal production. That's because Bliss builds and delivers more than a press. It provides a fund of engineering knowledge, going back 90 years, for its maximum production. That's why Bliss on your press is more than a name—it's a guarantee! Let a Bliss sales engineer help you get the most out of your presses. Send for him today.

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Side quarter panels for Nash cars undergo a series of forming and trimming operations in this battery of Bliss enclosed single action presses. The presses in the foreground are 124" between uprights and deliver 500 tons pressure at bottom of stroke.

The wide and deep bed of this 500-ton Bliss enclosed press is utilized to full advantage in production of Nash running board aprons. Double dies are used to pierce five holes in each of two aprons with each stroke.

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Rail Freight Raise Increases Trend To Backyard Steel Selling

Mills Pick Market, Customers; Cut Length of Hauls And Turn to FOB Sales

By GEORGE F. SULLIVAN
Pittsburgh Regional Editor

Pittsburgh

• • • **The May 6 rail freight** increases threw another road block between steel mills and some of their customers. They tightened the fence around all steel mills and further restricted the customer's ability to select his steel supplier. From steel the roads may not get the increased revenue they expect. For steel need not move by rail at its present volume. It can be diverted to trucks and barges and the length of the haul reduced. All of these things have been happening since the end of the war. The latest boosts just accelerate the trend.

The rate raises operate in two ways to oblige steel producers to change selling practices. In a number of areas the freight that mills would have to absorb to meet competition equals or exceeds the possible profit. In others it pushes it too close for comfort, the producers say. On top of this are substantial hikes in rail charges on ore, coal, scrap, limestone and almost every raw material the mills use. Steel price cuts made by a number of companies add extra force to this squeeze on profits.

The steel sales executive has four ways of handling freight absorption: (1) Withdraw from the market; (2) get the customer to pay the freight; (3) consider absorption in the overall cost picture and increase prices or decrease profit margins to compensate for it, or (4) ship more by truck and barge.

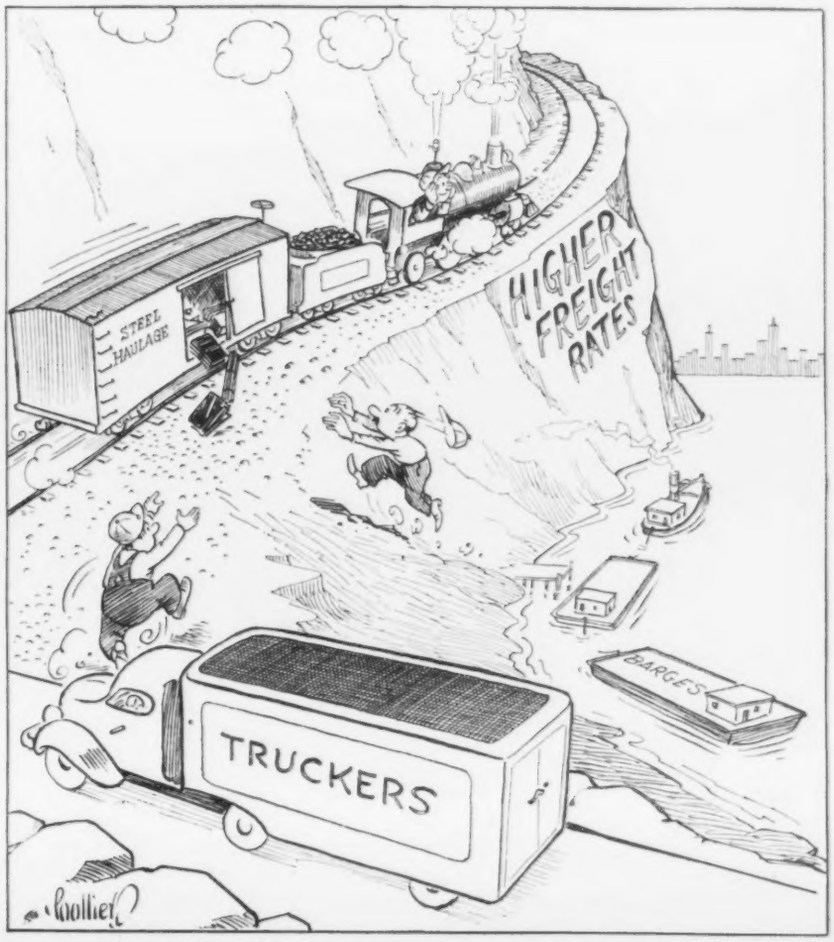
Of these, No. 1 has been most widely used. Since the war almost all mills have stopped selling some products in certain distant markets and some mills have withdrawn on all products from some areas. As usual, the increases hit Pittsburgh mills and their customers hardest because freight rates were advanced on a percentage basis. Early in 1946 a Pittsburgh producer could meet competition in the big New York City structural shape market by absorbing $3.80 a ton in freight charges. Today his absorption would be over $6 a ton. An educated guess is that at $6 a ton the Pittsburgh mill would either be giving away the steel or losing money on it. Roughly similar conditions prevail throughout the country and explain the wave of withdrawals in recent years.

The accompanying table shows how percentage rate raises have increased the amount a Pittsburgh mill must absorb to meet certain competitors shipping into three consuming points. The comparison is between the time when "Pittsburgh plus" was outlawed and the present.

In to-day's seller's market it is actually possible for a steel company to reduce its freight bill in the face of rising freight rates by careful choice of customers and market areas. This practice is well established with most mills. Each rate boost merely intensifies the study and usually cuts off a few more customers. The railroads suffer too from an actual drop in revenue.

Method No 2, getting the customer to pay the freight, is gaining popularity. The customer generally prefers it to a complete withdrawal. But it is being used with caution because of the possibility of discrimination, outlawed by the Robinson-Patman Act. It has already been publicized in connection with the withdrawal of Jones & Laughlin Steel Corp. from the Detroit arbitrary pricing system and re-

Good Pickin's



moval of its sheets and strip to a Cleveland base. Republic and Carnegie-Illinois have also withdrawn alloy bars from Detroit arbitrary delivered prices to their nearest basing points.

Other f.o.b. mill sales are less obvious but it is known that some consumers have been able to buy on f.o.b. mill pricing where it was a case of no discrimination; where the customer realized he was outside a mill's present market area and specifically asked for an f.o.b. mill price so as to get steel. Not all mills will sell this way.

Absorption is considered in the overall picture in two ways. One large steel company estimates its absorption at $1 million a month; it has withdrawn proportionally from fewer areas than many of its competitors. Part of this loss on freight equalization may be charged to maintenance of good customer relationships in the belief that it will be appreciated when the company is again actively seeking business. Some mills average the absorption on the account of an individual customer with plants in different cities. If the average is a figure the mill considers safe that account stays on the books.

Wider use of truck and barge shipments is anticipated by most steel company traffic managers. Trucks offer a loading problem on large shipments and slightly more loading expense, but so far, much lower rates on shipments within 300 miles or so. Barges present an opposite problem for consumers who don't normally get enough tonnage in a single shipment to make a minimum barge load. Some steel sales departments are now trying to work out ways to solve this problem.

FTC Rushes Its Case Against Steel, But Industry Wins Point

Washington

• • • **The Federal** Trade Commission's case against the nation's steel producers this week spurted ahead with renewed energy, following the long-awaited introduction of pricing data by government attorneys.

FTC's complaint, which charges use of the basing point system in violation of federal law, has taken on new importance in the eyes of Commission attorneys since the Supreme Court ruled out the use of basing points in the cement industry. FTC counsel is now plotting its course in line with the high court's majority opinion in the Cement Case.

Pricing data from approximately two thirds of the respondents in the steel case now have been formally admitted as evidence in the proceeding now before FTC. However, data from the major producers have yet to be admitted. The pricing information already in the FTC's hands is all from the so-called small producers.

The position of the major producers in objecting to the admission as evidence of pricing data is summarized by counsel for the Carnegie-Illinois Steel Corp. this way:

"If the trial examiner is to fulfill his obligation to award to these respondents a full and fair hearing, he should decline to receive in evidence the price data produced by Carnegie-Illinois Steel Corp. unless and until the authenticating witness has been recalled to the stand for full cross-examination.

"A full explanation of these documents, both as to their meaning and use, is an essential predicate to a proper understanding of the procedure followed by this respondent and will serve to delineate the proper inferences to be drawn therefrom," industry counsel continued. The Carnegie-Illinois objection was sustained.

Meanwhile, industry counsel last week continued its cross-examination of Walter S. Tower, president of the American Iron & Steel Institute, relative to non-pricing activities of AISI. Mr. Tower outlined AISI work in connection with steel research and development activities.

Lynn Paulson, chief counsel for FTC in the steel case, told THE IRON AGE that the introduction of price data is "significant gain in our case." The commission now will proceed to use these data, he said, as the basis of a study "to see if the basing point system is used and to ascertain if prices are uniform and identical."

Rail Freight Rates to Three Points and Absorption Increases

	July 1922 to May 1926	May 6, 1948
Pittsburgh—N.Y.C.	34¢ per 100 lb	55.9¢ per 100 lb
Sparrows Pt.—N.Y.C.	19¢ per 100 lb	37.7¢ per 100 lb
Pittsburgh absorption	$3.00 per ton	$3.64 per ton
Absorption increase		21.3 Pct
Pittsburgh—Toledo	27¢ per 100 lb	*40.3¢ per 100 lb
Cleveland—Toledo	20¢ per 100 lb	29.9¢ per 100 lb
Pittsburgh absorption	$1.40 per ton	$2.08 per ton
Absorption increase		48.6 Pct
Pittsburgh—Louisville	33.5¢ per 100 lb	55.9¢ per 100 lb
Middletown—Louisville	24.5¢ per 100 lb	33.8¢ per 100 lb
Pittsburgh absorption	$1.80 per ton	$4.42 per ton
Absorption increase		145.5 Pct

New High Speed Steels Developed By Latrobe

Latrobe, Pa.

• • • **Latrobe Electric** Steel Co. has started commercial production of a new line of high speed steels, according to a recent company announcement. The new line is being offered for sale at prices considerably lower than those now charged for the standard tungsten and molybdenum-tungsten high speed steels, one grade being priced as low as 43¢ per lb base.

Identified by Latrobe as the Electrite MV high speed steel group, this line is distinguished by its chromium, molybdenum and vanadium content with no tungsten present in the steels. According to the company announcement, these high speed steels are well adapted for applications which do not require the full properties of the more common tungsten bearing high speed steels. Applications for which the steels are recommended include small drills and reamers, thread chasers, taps, pipe taps, etc., woodworking knives and cutters and for body stock for carbide-tipped drills and reamers.

Base prices and typical analyses of these new steels are:

	Base price per pound	C	Cr	Mo	V
MV-1	$.43	0.80	4.10	4.25	1.10
MV-2	.48	0.88	4.10	4.25	2.00
MV-4	.58	1.18	4.10	4.25	3.15
MV-4	.68	1.40	4.10	4.25	4.15

Nonferrous Producers Anticipate No Change in Pricing Methods

Believe Basing Point Decision Will Not Ban Practice of Meeting Competition

By JOHN ANTHONY
Eastern Regional Editor

New York

• • • **There will be** no change in the method of pricing copper, lead and zinc as the result of the Supreme Court decision in the cement case affecting basing point delivered prices. This is the conclusion reached independently by officials of a number of metals producing companies after exhaustive study of the decision and consultation with counsel.

The consensus of those who have studied the problem is that the decision merely reaffirms the illegality of price fixing agreements among producers and in itself contains no new threat to the established commercial practice of meeting competitive prices at any delivery point where there is no combination which might be considered to be in restraint of free trade. However, subsequent decisions on cases now pending will be studied closely for their implications on industry pricing methods.

Running like a refrain through the majority decision of the cement case is phraseology describing the industry use of the basing point delivered price system as a concerted effort to eliminate price competition among producers.

The majority opinion supported the FTC's findings that there were "numerous concerted activities carried on in order to make the multiple basing point system work in such a way that competition in quality, price and terms of sale of cement would be non-existent, and that uniform prices, job contracts, discounts, and terms of sale would be continuously maintained. The Commission found that many of these activities were carried on by the Cement Institute, the industry's unincorporated trade association, and that in other instances the activities were under the immediate control of groups of respondents. Among the collective methods used to accomplish these purposes, according to the findings, were boycotts; discharge of uncooperative employees; organized opposition to the erection of new cement plants; selling cement in a recalcitrant price cutter's sales territory at a price so low that the recalcitrant was forced to adhere to the established basing point prices; discouraging the shipment of cement by truck or barge; and preparing and distributing freight rate books which provided respondents with similar figures to use as actual or "phantom" freight factors, thus guaranteeing that their delivered prices . . . would be identical on all sales. . . ."

The metal industry is of the opinion that the decision does nothing to outlaw independent producer action to meet competitive prices at any delivery point.

The Commission's order on the cement industry is limited, in the words of the court, "by the preamble which refers to concerted conduct in accordance with agreement or planned common course of action."

The preamble directs that all of the respondents "do forthwith cease and desist from entering into, continuing, cooperating in, or carrying out any planned common course of

(CONTINUED ON PAGE 124)

50 YEARS AGO

THE IRON AGE, *May 12, 1898*

• "The craze for automobile vehicles is reported to have reached a high pitch in Paris. Automobile carriages and tricycles are to be seen everywhere in the streets of that city, and the supply falls so far short of the demand that prices have gone up materially. The best makers are said to have more orders on their hands than they can fill in two years."

• **"May Day passed without any specially notable labor events such as have marked this day in recent years. Only a few sporadic bread riots in Italy and the usual socialistic speeches in various cities were reported."**

• "Preparations are being made at Hammond, Ind., for the utilization of blast furnace slag in an entirely new manner. A process has been discovered whereby slag may be used for the manufacture of carbolite from which ethylene gas is produced. This gas is defined as an improvement over acetylene but having the same general characteristics."

• **"The experimnet made by the War Dept. of introducing reindeer into Alaska for transportation use for exploration has proved a complete failure. Most of the herd has starved to death."**

• "Frederick Siemens' new form furnace for the reheating of iron and steel is meeting with good supccess in England and on the Continent where as many as 40 were built during the past year. The furnace can be arranged as a soaking pit or vertical furnace for steel ingots."

• **"The wave of patriotism now sweeping through the land calls for such an enormous number of flags that a famine of bunting is declared. Even the War Department is unable to get enough flags for Army use."**

Industrial Briefs . . .

• ACQUISITION — Brainard Steel Co., Warren, Ohio, wholly-owned subsidiary of Sharon Steel Corp., has bought Tel-O-Post Co., Akron, Ohio. It will operate as the Tel-O-Post Div. of Brainard and will take certain products of Brainard to market in further fabricated form.

• BROWN EXPANDING — A $2,500,000 expansion program, announced by Brown Instrument Co., Philadelphia, will add more than 60 pct to its present manufacturing space and a proportionate increase in employment. The program includes construction of a four-story addition to the main plant at Wayne Junction.

• GOLDEN ANNIVERSARY —Kearney & Trecker Corp., Milwaukee, builders of precision and production machine tools, will celebrate its golden anniversary on May 17 with an open house for its employees and their families.

• PMI OFFICERS—The Pressed Metal Institute has elected the following officers for the 1948-1949 fiscal year: Tom J. Smith Jr., president; Walter A. Gorrell, vice-president; and J. J. Boehm, secretary-treasurer.

• MOVING—Martin-Quaid Co., alloy metal fabricators, is in the process of moving to new and larger quarters at 1815 W. Sedgley Ave., Philadelphia.

• PURCHASE — Van Norman Co., Springfield, Mass., has purchased the Fitchburg Grinding Machine Co., makers of grinding equipment used in automotive and aircraft work.

• ENGINEERING CONSULTANT—Spektor Production Engineering Co. has announced the opening of its consultant engineering offices at 111 Broadway, New York City.

• NEW COMPANY—Harry L. Showalter, Jr. has announced the forming of his own company, Girard Associates, with principal offices in Philadelphia and Chambersburg, Pa. The firm specializes in sales and engineering related primarily to the forge and press shop field.

• MORE CYLINDERS — Jay Creswell, president of Pneumatics, Inc., Plymouth, Ind., has purchased all of the capital stock of the Anker-Holth Mfg. Co. of Port Huron, Mich., to expand his line of cylinders and air valves.

• REORGANIZES — A group headed by J. C. Wilson, Jr. has acquired the Acro Welder Mfg. Co., Milwaukee, manufacturers of resistance welding and brazing machines. The new firm plans to expand engineering and production facilities, make design changes and supplement the Acro line.

• SALES AGENT—J. Herbert Cox & Associates, 206 Auditorium Bldg., Cleveland, representing six affiliate companies of the Barium Steel Corp. in Ohio, has announced the appointment of Homer L. Ruh & Co., 1811 Guilford Road, Columbus, as their sales representatives for the southern part of Ohio.

• CHEMICAL PLANT — The Cowles Detergent Co., Cleveland, has announced the completion of a new million dollar plant at Skaneateles Falls, N. Y. This modern chemical plant is equipped for the manufacture of heavy chemical detergent silicates as well as specialized detergents.

• REPRESENTATIVE — The Rueger Co., Los Angeles, has been appointed exclusive sales representative for the Threadwell Tap & Die Co., Greenfield, Mass., in the eleven Rocky Mountain and Pacific Coast state and the territory of Hawaii.

J & L Mainstay Retires After 48 Years' Service

Pittsburgh

• • • **After nearly 48 years** of active service with Jones & Laughlin Steel Corp., W. J. Creighton has decided to call it quits.

During his tenure with the corporation, Mr. Creighton moved from accounting clerk to consultant to the chairman of the board of directors. He joined the accounting department of Jones & Laughlin, Ltd., on Aug. 8, 1900, when he was 18 years of age. After serving as assistant auditor of the raw materials subsidiaries, he was appointed assistant auditor of Jones & Laughlin Steel Co. in 1910. In 1911 he became auditor of the company and in 1918 he was elected controller.

W. J. Creighton

Mr. Creighton continued to hold that office until he was elected a director and vice-president in 1928. After that he served as vice-president on the executive committee until he was appointed consultant to the chairman of the board of directors in 1947.

In announcing his retirement, Jones & Laughlin described Mr. Creighton as "a tower of strength" in the corporation.

Monopoly Commission Is Authorized In England

London

• • • **A monopoly commission** is to be set up by the British government to investigate monopolies and restrictive practices in trade and industry.

A bill brought in for the purpose also seeks to give the government, subject to Parliamentary control, special powers for dealing with such monopolies as are found to operate against the public interest.

The Commission will act on information given by the Board of Trade. Instances which will be referred to the Commission are where agreements or arrangements exist which prevent or restrict competition in relation to the export of goods from the United Kingdom.

Construction Steel . .

• • • **Fabricated steel awards** this week included the following::

22 Tons, Kingham, Ariz., transmission lines for U. S. Bureau of Reclamation to Bethlehem Pacific Coast Steel Corp., San Francisco.

280 Tons, Iowa City, Iowa, Benton St. bridge through Jensen Construction Co. to Pittsburgh-Des Moines Steel Co., Des Moines.

370 Tons, Hinsdale, Ill., high school building to Gage Structural Steel Co., Chicago.

215 Tons, Montour, Iowa, highway bridge sections-768-2 through Brogan Construction Co. to Pittsburgh-Des Moines Steel Co., Des Moines.

130 Tons, Grand County, Wis., highway bridge S0573-1 through Herbert Turner Construction Co. to American Bridge Co., Pittsburgh.

125 Tons, Antangon, Mich., boiler house to Wisconsin Bridge & Iron Co., Milwaukee.

110 Tons, New York, one-story building at Dyre & Rambouts Aves., to Grand Iron Works, Inc., New York.

85 Tons, New Rochelle, N. Y., library building at Iona College, to Grand Iron Works, Inc., New York.

• • • **Fabricated steel inquiries** this week included the following:

600 Tons, Hanford, Wash., atomic energy plant.

500 Tons, North Kansas City, building for the North Kansas City Development Co.

200 Tons, East St. Louis, aluminum ore plant for the Aluminum Co. of America.

• • • **Reinforcing bar awards** this week included the following:

1200 Tons, Chicago atomic energy research building for the University of Chicago, through J. W. Snyder & Sons Construction Co. to Ceco Steel Products Corp., Chicago.

600 Tons, Saginaw, Mich., veterans' hospital through Spence Bros. Construction Co. to Ceco Steel Products Corp., Chicago.

400 Tons, Chicago, Beverly-Calumet sewer through M. J. Boyle Co. to Ceco Steel Products Corp., Chicago.

Industrial Building Declines

Washington

• • • **New industrial building** continued its decline for the first quarter 1948 and was the only major type of construction activity failing to register a gain over the same period in 1947, says the Dept. of Commerce.

Some $373 million in new industrial starts were reported for the quarter as compared with $457 million last year, a drop of 18 pct. On the other hand, business construction such as stores, warehouses, offices, etc., increased from $188 million for the first quarter last year to $266 million for 1948.

Total volume of construction for March amounted to $1.1 billion to bring the total for the first quarter to $3.1 billion, nearly a fourth more than for the same period 1947 and indicating that government estimates of $15 billion plus may be reached.

Housing and Atomic Energy Included In Allocation Program

Washington

• • • **The Office of** Industry Cooperation's program for channelling steel to key areas of the economy moved into two new fields last week —housing and atomic energy. At a meeting with OIC officials, the Steel Products Advisory Committee approved programs calling for the allocation of 212,000 tons of steel to the warm air furnace industry and an additional 159,890 tons to the Atomic Energy Commission. Both programs cover an 8-month period ending Feb. 28, 1949. While these programs must be approved by the Steel Producers Advisory Committee, no delay is expected in obtaining such approval. However, the programs are not expected to get under way until the middle of the third quarter.

At the same meeting, industry members turned down an OIC request for sufficient steel to build 7,590 all-steel prefabricated houses this year. Industry members pointed out that more conventional houses can be built with considerably less steel, since prefab houses require from 4.5 to 9 tons of steel per unit, while conventional houses require only 1½ tons per unit. OIC is not inclined to argue with this position.

Petroleum and gas industry requirements were also discussed with industry members stating that these figures would have to be analyzed carefully before any commitment could be made.

OIC has already slashed the industry's 10 million ton plus estimate of 1948 requirements to 6,604,733 tons by eliminating the following indirect requirements: tankers and barges, tank cars, tank trucks, containers, and substantial line pipe. These commodities will be considered as a part of other programs. For example, tank cars are already provided for in the freight car program which will take 3,014,700 tons of steel this year.

In addition, the industry committee expressed opposition to continuation of spot assistance for government projects, pointing out that these should be part of overall programs.

The 212,000-ton allocation for warm air furnaces is the first of the housing programs to be put forth. The total tonnage is estimated as less than a 20 pct increase over the amount now going to this industry. It is designed to provide 250,000 furnaces for new installation and 100,000 replacement units. This tonnage is made up entirely of hot and cold-rolled and galvanized sheet.

The Atomic Energy Commission's requirements provide for expansion of AEC facilities. A breakdown of this tonnage follows:

AEC STEEL REQUIREMENTS UNDER VOLUNTARY ALLOCATIONS PROGRAM

	Third Quarter 1948	Fourth Quarter 1948	January-February 1949
Reinforcing Bars..	10,405	8,940	3,293
Structural Shapes	10,584	6,306	3,317
Plates	27,140	31,020	9,383
Galvanized Sheet..	325	325	250
Other Sheet	2,322	2,513	1,307
Rails	995	1,280	430
Steel Pipe	11,112	19,033	6,237
Seamless Tubing..	1,408	1,382	583
TOTAL	64,291	70,799	24,800

AMERICAN IRON AND STEEL INSTITUTE — Blast Furnace Capacity and Production—Net Tons — MARCH - 1948 (Month)

	Number of companies	Annual blast furnace capacity	Production: Pig Iron — Current month	Pig Iron — Year to date	Ferro manganese and spiegel — Current Month	Ferro manganese and spiegel — Year to date	Total — Current month	Total — Year to date	Percent of capacity — Current month	Percent of capacity — Year to date
Distribution by Districts:										
Eastern	11	13,093,560	898,811	2,765,761	25,354	79,918	924,165	2,845,679	83.3	87.4
Pittsburgh-Youngstown	17	25,588,120	1,984,131	5,889,663	25,854	79,700	2,009,985	5,969,363	92.7	93.8
Cleveland-Detroit	6	6,495,000	506,379	1,470,732	-	-	506,379	1,470,732	92.0	91.1
Chicago	7	14,700,290	1,009,563	3,014,433	-	-	1,009,563	3,014,433	81.0	82.5
Southern	8	4,949,660	375,979	1,132,078	6,650	24,091	382,629	1,156,169	91.2	93.9
Western	3	2,612,300	186,966	597,101	-	-	186,966	597,101	84.5	91.9
Total	35	67,438,930	4,961,829	14,869,768	57,858	183,709	5,019,687	15,053,477	87.8	89.8

Stockholders Ask More Cash Return But Don't Object to Price Cuts

Hoboken, N. J.

• • • **Demands for a** larger financial return to stockholders were renewed at the annual meeting of the United States Steel Corp. here last week. The more vocal stockholders held that this objective could be realized if a share of capital expenditures for plant expansion and improvement were to be based on borrowed funds at current low interest rates instead of the present policy of financing largely from income.

Enders M. Voorhees, chairman of the finance committee, who presided at the meeting in the absence of Irving S. Olds, board chairman, responding to allegations that Bethlehem Steel Co. had a more liberal dividend policy than U. S. Steel, said that the corporation had distributed 56 pct of its total income to its stockholders in 1947 in comparison with Bethlehem's distribution of only 48 pct. Mr. Voorhees also said that it was a better policy for heavy industry to finance capital expenditures largely out of income during inflationary periods such as the present.

Capital expenditures for the construction and improvement of plant during 1947 were $206 million. In the first quarter an additional $52 million were spent, and an additional $400 million was authorized for the future. But constantly mounting costs may make this figure higher.

A good deal of discussion revolved around the desirability of the formation of a stockholders' committee to work with the management on questions of broad policy where the interests of the stockholders and matters of public relations are involved. The sentiment of the majority of shareholders at the meeting as expressed by vote seemed to be against the need for imposing this additional responsibility on management.

There was no opposition by the stockholders present at the meeting to the recently announced $25 million price cut in steel products, despite all the discussion of the need for a higher dividend rate.

Nonferrous Producers

(CONTINUED FROM PAGE 121)

action, understanding or agreement, combination or conspiracy, between and among any two or more of said respondents . . . to do or perform any of the following things. . . ."

As metals producers view the decision in the light of their own company pricing policies, the entire problem hinges on the definition of combination or concerted action accepted by the court in subsequent actions. According to industry officials, this is the basic difference of opinion between the Supreme Court majority and the lower court decision on the case.

As phrased by Justice Burton in his dissenting opinion, "The Commission based its conclusions upon its finding of the existence of the combination charged in its complaint. The court below was in a position to, and did, judicially examine the record at length, hear extended argument upon it and pass upon the many inferences to be drawn from the evidence it contained. In the light of that court's recent experience with many cases in this particular field of law, and of what it has described as its 'long and careful study of the situation,' it concluded that the evidence was not sufficient to support a finding of the combination charged. Its opinion reviewed the evidence and pointed out many weaknesses in the inferences upon which the Commission had based its finding of the alleged unlawful combination."

The dissenting opinion goes on to state "On the view of the evidence taken by the court below and by me, that evidence does not support the Commission's finding of the combination as charged. Unlike the Commission and the majority of this court, the lower court and I, therefore, have faced the further issue presented by the Commission's charges unsupported by a finding of the alleged combination. This has led us to consider an issue quite different from that decided by this court today. That issue lies within the long-established and widespread practice by individuals of bona fide competition by freight absorption with which practice Congress has declined to interfere, although asked to do so."

STOCKHOLDERS' LUNCHEON: *Ben Fairless, president U. S. Steel Corp., is shown entertaining stockholders at the historic luncheon following business session of the annual stockholders meeting. One shareholder suggested that the Corporation add women to its board of directors.*

Wage Demands on Ford Estimated at 50¢ an Hr

Detroit

• • • **With the CIO** steelworkers stuck in the basement of the U. S. pay structure, the lusty CIO autoworkers have run the wage elevator up to the penthouse with a whopping demand for an estimated 50¢ an hr for 107,000 Ford workers.

The Ford wage demands were approved this week by the National Ford Council meeting in Detroit.

The list of demands to be served on Ford includes: (1) a medical benefit plan, (2) a company-financed pension plan, (3) a guaranteed weekly wage, (4) 3-week vacation with pay, (5) return of the 20-min lunch period recently taken away, (6) a 10¢ bonus for night workers, (7) a discount for Ford workers buying automobiles.

The union says it will offer a plan to finance pensions by a bonus system based on Ford production.

Weekly Gallup Polls . . .

Majority in U. S. Favor International Meeting For Peace

Princeton, N. J.

• • • **Although President Truman** said that he would not go out of the United States to meet with Stalin, a substantial proportion of American voters think that an international meeting among the heads of the major nations is worth trying, according to George Gallup, director, American Institute of Public Opinion.

They feel that some compromise or settlement of differences might be achieved which would make peace less doubtful than it seems to be now.

From coast-to-coast interviewers for the institute put the following question to a cross-section of voters:

"Do you think it would be a good idea or a poor idea for President Truman to call an international meeting with Stalin and heads of other nations to work out more effective plans for peace?"

The vote follows:

	Pct
Good idea	63
Poor Idea	28
No opinion	9

Those who said it would be a good idea to hold such a conference were asked:

"Do you think we would be successful in coming to an agreement with Stalin?"

While the answers given are not particularly optimistic, more people say they think some agreement could be reached than say the effort would be a failure. In actual percentages only about one third think it would not succeed. But judging by their answers to the first question, even these doubters think a meeting would be worth trying, on the chance that something useful would come of it.

VOTE OF THOSE FAVORING MEETING

	Pct	
Yes, think meeting would succeed	34	39
Qualified Yes	5	
No, think meeting would fail		35
No opinion		25

• • • **For months** Russian propagandists have been telling Europe that a business depression is on the way in the United States and that it was to forestall this collapse that the Marshall Plan was devised.

However, evidence from public opinion polls in four European countries—Holland, Britain, France and Italy—shows that only a minority of voters fear a business collapse in the United States within the next 2 years.

As for American opinion, a recent survey by the institute finds that one person in four in the United States thinks we will have a depression within 2 years, while less than 10 pct think it will come in 1 year.

The ordinary voter, not being an expert in economic matters, has of course no special knowledge on which to base a prediction about the business future. But his fears and his relative degree of pessimism or optimism about the future can be measured. It is on just such general fears that the Russian propaganda about an American economic collapse is based.

Fear of U. S. Depression Is Not Widespread in Europe Despite Russian Propaganda

o o o

Polls on the issue were conducted by affiliates of the 12-nation world Gallup Poll organization. The question asked was:

"Do you think that a serious business depression is likely in the United States within the next 2 years?"

The vote in the four foreign nations polled, and in the United States, follows:

	Likely Pct	Unlikely Pct	No opin. Pct
Italy	14	35	51
Holland	15	30	55
Britain	33	28	39
France	33	33	34
USA	25	52	23

Coming Events

May 15-22 International Petroleum Exposition, Tulsa, Okla.

May 19 Bituminous Coal Research, Inc., annual meeting, Columbus, Ohio.

May 26-27 American Iron & Steel Institute, meeting, New York (restricted to members only).

May 27-29 Society for Experimental Stress Analysis, meeting, Pittsburgh.

May 31-June 5 American Society of Mechanical Engineers, semiannual meeting, Milwaukee.

June 6-9 American Gear Manufacturers Assn., annual meeting, Hot Springs, Va.

June 7-9 American Coke and Coal Chemicals Institute, annual meeting, White Sulphur Springs, W. Va.

June 10-12 National Steam Specialty Club, annual meeting, Hot Springs, Va.

June 16-18 Electric Metal Makers Guild, annual meeting, Bethlehem.

June 21-25 American Society for Testing Materials, annual meeting, Detroit.

June 28-July 1 American Electroplaters' Society, Convention and Industrial Finishing Exposition, Atlantic City.

June 28-July 1 American Electroplaters' Society, convention and Indus-

July 16-24 American Road Builders' Assn., convention and Road Show, Soldier Field, Chicago.

June 6-11 Society of Automotive Engineers, summer meeting, French Lick, Ind.

MACHINE TOOLS

. . . News and Market Activities

Signs of the Summer Lull Seen in Dwindling Tool Inquiries

• • • While various segments of the machine tool industry were buzzing with an assortment of rumors, all more or less relative to the European Recovery Program, signs of the summer lull began cropping up this week in the form of dwindling inquiries and plant vacation schedules.

It has been evident for some time that several months might be required to set up the proper procedures under ERP for the channeling of machine tool orders, and as yet, a deputy administrator in charge of capital or durable goods has not yet been appointed. And until a deputy administrator is appointed, the entire program insofar as it affects the machine tool industry is in complete abeyance.

Some of the Marshall Plan countries have sent representatives to Washington in an effort to speed up the procedure, but informed sources consider this practice simply a waste of time and money. About all the industry can expect to do from point of time will be to get the first influx of ERP orders sometime in the third quarter.

Contract tool and die shops who stand to benefit indirectly from ERP purchasing report that business is not too good. March reports indicate business for that month somewhat under March a year ago. Volume is generally considered to be pretty good, although the backlog is low. Shop owners report very considerable competition, which is a definite factor in bringing prices down. Best bet for the tool and die shop operators at this time seems to be the domestic rearmament program, which will require a lot of tooling, whether anything is produced in the way of end products in the immediate future or not.

In Detroit most segments of the machine tool industry report a substantially unchanged but fairly active market for their products. Large commitments are far from numerous, it is reported, although a considerable volume of inquiries is being received. Some sizable orders for replacement items are coming through.

Awaits Appointment of Deputy Administrator Before ERP Orders Are Placed

o o o

Informed sources report that some production tooling orders for Buick have recently been placed here; also orders for replacement machines for Kaiser-Frazer have been closed. Long range Reo commitments, it is indicated, are being confined for the present to equipment with delivery dates of 6 months and longer.

Potential tooling programs that are being clearly watched include the new Ferguson Tractor plant, a new engine program said to be under consideration by Continental Motors and the new General Motors high compression engine plant at Lansing.

Considerable activity continues in the tool and die field and a sizable volume of Chrysler die work is now in process, it is reported. In addition, recent foundry orders have been placed by Chevrolet, Tucker and Studebaker, indicating a start on a new model program. In each case the orders have been described to IRON AGE as "substantial."

Recent indications are that the tooling for the new Buick dynaflow transmission is now complete. Also, there are reports that a new machine tool program may get under way in the near future for Saginaw-Chevrolet plant.

Volume in tool and die shops the first 2 months of this year was about 90 pct of 1947, and the first 2 months were the best part of last year.

In the East, dealers are anxiously awaiting information on how armament purchases of machine tools are to be handled. According to reports, there is a move afoot to promote buying direct by government, which would be likely to cut the trade out of any participation in the program. In the last war government procurement of tools was begun, but the dealers were soon brought into the program.

Dealer volume of May business is reported to be falling off. South American countries are still unable to buy tools in this country due to the shortage of dollars and their exchange restrictions. There are a few countries that have not imposed exchange controls, principally Cuba and Venezuela, but the volume of orders which can be expected from these countries is small.

Additional funds are expected to be granted to Latin America by the Export-Import Bank and the World Bank has asked Congress for $500 million. Tool exporters are not expecting any results from these programs until next year.

In the meantime, the program of off-shore purchasing for the economic administration is expected to build dollar reserves in Latin American nations by the third and fourth quarter of this year.

Some spots in the East have been in a bad way on sales since the first of the year and are showing no signs of recovering from this apathy. April sales were down and May to date has been anything but encouraging. Some producers have no more than 4 weeks' orders on the books and there are others with less than 3 months.

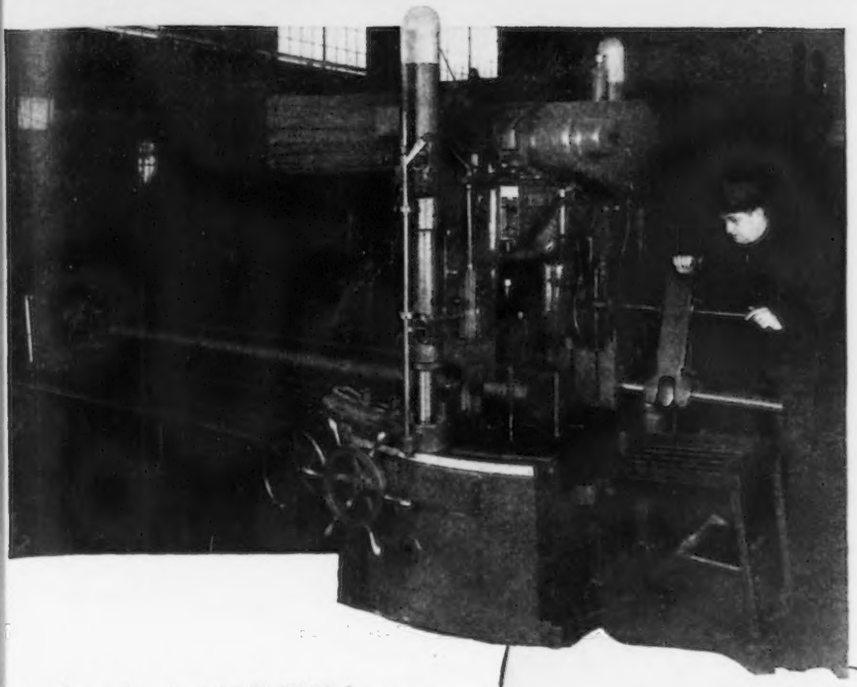
Only those who are losing money are seriously disturbed, however, for many segments of the industry became quite used to periods of extreme quiet before World War II.

Foreign WAA Goods Down

Washington

• • • **Less than $400 million** worth of war surpluses abroad remain for disposal, the State Dept. has informed Congress in its quarterly report on activity of the Office of Foreign Liquidation. Current inventories total about $255 million and another $130 million remains to be declared.

As of Apr. 1, a total of $10.8 billion worth had been declared and $9.5 billion disposed of through sales channels, including bulk sales.



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January 19, 1948

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Since both U·S·S COR-TEN and U·S·S MAN-TEN, like plain carbon steel, can be readily fabricated . . . since one-fourth less steel is required per unit, with consequent reduction in shipping costs . . . since fixed charges can be spread over one-third more units . . . your finished product can be built at little or no increase in cost.

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UNITED STATES STEEL

SCRAP

. . . News and Market Activities

Market Active With Few Price Changes

New York

• • • **As was the case** throughout most of last month, the majority of districts reported that mills were receiving more scrap than was being consumed. This has not been reflected, however, by any market weakness. The demand is still there. In fact the Philadelphia market, which has been showing strength for several weeks, reports what amounts to a break in the formula as delivered prices went up somewhat in excess of last week's freight rate increase.

The extent to which the possibility of a railroad tieup stimulated and strengthened last week's market is difficult to determine, but the limited number of cars available hamstrung most attempts to accelerate deliveries. In this connection, dealers have estimated that even a 6 hour railroad stoppage would easily snarl things up for from 3 days to 2 weeks depending on the particular shipper's facilities.

An interesting development affecting the Buffalo district was a request by the Canadian government asking Dominion dealers to stop taking material from the Buffalo area. The action was motivated by pressure from our government after complaints by American firms. The move is expected to relieve somewhat the tightness in that district which has been further accentuated by heavy out-of-district buying in eastern New York state.

Good receipts on foundry material continued in most districts. Prices on the items remained firm with the larger foundries claiming all they could get.

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PITTSBURGH—There were no price changes during the past week. Some mills are reportedly getting shipments a little better than consumption while others are laying down a fair amount of material. Due to lighter density of present day material additional stockpiling space is required in some cases. According to trade sources, Carnegie-Illinois Steel Corp. purchasing men are making a determined effort to impress scrap suppliers, among others, with the importance of cooperating in the anti-inflation drive recently launched by U. S. Steel.

CHICAGO—The weakness in foundry scrap appears to be restricted to smaller plants whose supply of pig iron and coke are thin. Larger foundries still able to operate are paying the old high prices for scrap and these prices, therefore, are the representative tonnages. So far the mills say they will not absorb the late freight rate increase in the Chicago switching area. This means the shipper pays the extra 10¢ a ton. Once again the railroads have earmarked all the late lists on railroad heavy melting to the mills at the mills' price.

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PHILADELPHIA — The market was stronger here last week and brokers were buying No. 2 melting at $39 and No. 1 at $42. Higher prices were paid for turnings. Therefore openhearth and blast furnace grades are quoted higher than called for by the consumer formula. While this is the first evidence in this market of a break through of the formula, for some time consumers have been accepting No. 1 as exempt grades such as low phos. The new freight rates are now applicable a ! are covered by the present rise in the market. Brokers were hounding dealers last week to get in their scrap on old orders so as to minimize their freight increase absorption. Cast grades remain firm but without increase except for heavy breakable. Mills continue to need scrap to maintain the current ingot rate, but yard inventories are low.

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CLEVELAND—Brokers are finding it hard to buy, although shipments are fairly good, but not as good as consumers would like to have them. Some of the brokers have slowed down on the over-the-formula buying and most consumers, mills as well as foundries, seem to be pretty well set for the rest of the month. At the moment, the trade is awaiting action on the part of the mills on the freight rate increase. In the absence of anything definite, it looks now as if mills will keep shipping point prices the same and absorb the additional freight. Some consumers favor applying the new freight rates at the shipping point and at the destination, but in view of scrap market conditions, these consumers will probably be forced to go along with the more liberal policy.

•

DETROIT—For the present the price of scrap is reported to be stabilized in Detroit although the market undertone is strong. A scattering of sales at over-the-formula prices to other than mill buyers is reported. Shipments to local mills continue in good volume with the strongest pressure reported on No. 1 bundles. No change in cast grades is evident this week. Indications are, however, that barring weakness developing from a possible Chrysler strike or a rail stoppage, the price of this grade may stiffen as local buyers out of the market for several weeks return to competitive bidding for available scrap.

•

NEW YORK—Market firmness and steadiness continues with lots of material moving. Freight increases are being absorbed by consumers. Strength in cast items has been expected by many dealers, but they continue to get more material than they expect and prices are holding accordingly.

•

BUFFALO—No important business developed in openhearth grades as dealers continued to shy away from big orders because of light shipments from territory to the east where they have been outbid by outside mills with high springboards. As for several weeks, most of the stuff reaching here from that section was sheet scrap. The rail freight increase is generally expected to be absorbed by consumers. Protests to Washington that scrap needed by local mills was moving over the border into Canada resulted in action by the Dominion government last week. Ottawa requested an unnamed Canadian dealer to stop purchases in the Buffalo area. Canadian officials were said to be confident that the request would halt the traffic.

•

CINCINNATI—There has been no material change in the market here. Demand for material has quieted down somewhat following the coal strike, but a few dealers here and there are holding out for more money, which is probably the result of the recent over-the-formula buying. Foundries' requirements are pretty well satisfied at present, and steel foundries are beginning to take material again.

•

BIRMINGHAM—Scrap moving into Birmingham from shipyard wrecking at Gulf ports has dropped off until current receipts from that source are the lowest in 5 years. Steel grades from other sources are relatively plentiful but demand for cast continues to exceed supply. Prices remain firm.

•

BOSTON—Demand is somewhat stronger following a spotty situation. Prices are unchanged from last week. Foundries continue to accept all the cast offered them at firm prices.

•

ST. LOUIS—Heavy breakable cast, which was strong during the coal strike, has eased off as a result of heavy movement and is $1 a ton down. Otherwise the market in the St. Louis district is unchanged. Generally the movement has been good with receipts greater than the current melt.

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$40.00 to $40.50
RR. hvy. melting	41.00 to 41.50
No. 2 hvy. melting	40.00 to 40.50
RR. scrap rails	55.50 to 56.50
Rails 2 ft and under	62.50 to 63.50
No. 1 comp'd bundles	40.00 to 40.50
Hand bdld. new shts.	40.00 to 40.50
Hvy. axle turn.	41.50 to 42.00
Hvy. steel forge turn.	41.50 to 42.00
Mach. shop turn.	35.50 to 36.00
Shoveling turn.	38.00 to 38.50
Mixed bor. and turn.	35.50 to 36.00
Cast iron boring	38.00 to 38.50
No. 1 cupola cast.	63.00 to 65.00
Hvy. breakable cast.	52.50 to 53.50
Malleable	77.00 to 79.00
RR. knuck. and coup.	54.50 to 55.50
RR. coil springs	54.50 to 55.50
RR. leaf springs	54.50 to 55.50
Rolled steel wheels	54.50 to 55.50
Low phos.	47.00 to 47.50

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.00 to $39.50
No. 2 hvy. melting	39.00 to 39.50
No. 1 bundles	39.00 to 39.50
No. 2 dealers' bundles	39.00 to 39.50
Bundled mach. shop turn.	37.00 to 37.50
Galv. bundles	35.00 to 35.50
Mach. shop turn.	34.00 to 34.50
Short shov. turn.	35.50 to 36.50
Cast iron borings	35.50 to 36.50
Mix. borings & turn.	34.00 to 34.50
Low phos. hvy. forge	44.00 to 48.00
Low phos. plates	42.50 to 45.00
No. 1 RR. hvy. melt.	41.25 to 41.75
Rerolling rails	53.00 to 54.00
Miscellaneous rails	51.00 to 52.00
Angles & splice bars	52.00 to 53.00
Locomotive tires, cut	54.00 to 55.00
Cut bolster & side frames	49.00 to 51.00
Standard stl. car axles	58.00 to 59.00
No. 3 steel wheels	51.00 to 52.00
Couplers & knuckles	54.00 to 55.00
Rails, 2 ft and under	56.00 to 57.00
Malleable	76.00 to 78.00
No. 1 mach. cast	72.00 to 75.00
No. 1 agricul. cast.	61.00 to 65.00
Heavy breakable cast.	51.00 to 52.00
RR. grate bars	59.00 to 61.00
Cast iron brake shoes	58.00 to 60.00
Cast iron carwheels	58.00 to 60.00

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.50 to $39.50
No. 2 hvy. melting	38.50 to 39.50
No. 1 bundles	38.50 to 39.50
No. 2 bundles	38.50 to 39.50
Mach. shop turn.	33.00 to 33.50
Shoveling turn.	35.00 to 35.50
Cast iron borings	32.50 to 33.00
Mixed bor. & turn.	32.50 to 33.00
Low phos., plate	46.00 to 48.00
No. 1 cupola cast	63.00 to 64.00
Hvy. breakable cast.	53.00 to 54.00
Rails 18 in. & under	60.00 to 61.00
Rails random length	51.00 to 52.00
Drop broken	66.00 to 68.00

BOSTON

Dealers' buying prices, per gross ton, f.o.b. Boston

No. 1 hvy. melting	$31.65 to $31.90
No. 2 hvy. melting	31.65 to 31.90
Nos. 1 and 2 bundles	31.65 to 31.90
Busheling	31.65 to 31.90
Shoveling turn.	.... 28.90
Machine shop trun.	.... 26.90
Mixed bor. & turn.	.... 26.90
Cl'n cast chem. bor.	38.00 to 40.00
No. 1 machinery cast	56.00 to 60.00
No. 2 machinery cast	55.00 to 57.00
Heavy breakable cast	50.00 to 52.00
Stove plate	52.00 to 53.00

DETROIT

Per gross ton, brokers' buying prices f.o.b. cars:

No. 1 hvy. melting	.... $35.50
No. 2 hvy. melting	.... 35.50
No. 1 bundles	.... 35.50
New busheling	.... 35.50
Flashings	.... 35.50
Mach. shop turn.	$29.00 to 29.50
Shoveling turn.	30.00 to 30.50
Cast iron borings	30.00 to 30.50
Mixed bor. & turn.	28.50 to 29.00
Low phos. plate	39.50 to 40.50
No. 1 cupola cast	55.00 to 57.00
Heavy breakable cast	48.00 to 52.00
Stove plate	50.00 to 52.00
Automotive cast	55.00 to 57.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$42.00 to $43.00
No. 2 hvy. melting	39.00 to 39.50
No. 1 bundles	42.00 to 43.00
No. 2 bundles	39.00 to 39.50
Mach. shop turn.	34.00 to 35.00
Shoveling turn.	34.00 to 35.00
Mixed bor. & turn.	34.00 to 35.00
Clean cast chemical bor.	42.00 to 44.00
No. 1 machinery cast	65.00 to 66.00
No. 1 mixed yard cast	62.00 to 63.00
Hvy. breakable cast.	62.00 to 63.00
Clean auto cast.	65.00 to 66.00
Hvy. axle forge turn.	44.00 to 45.00
Low phos. plate	47.00 to 48.00
Low phos. punchings	47.00 to 48.00
Low phos. bundles	45.00 to 46.00
RR. steel wheels	52.00 to 53.00
RR. coil springs	52.00 to 53.00
RR. malleable	75.00 to 78.00
Cast iron carwheels	68.00 to 70.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$41.00 to $42.00
No. 2 hvy. melting	37.50 to 38.50
Bundled sheets	37.50 to 38.50
Mach. shop turn.	33.00 to 33.50
Locomotive tires, uncut	46.00 to 47.00
Mis. std. sec. rails	46.50 to 47.50
Steel angle bars	49.00 to 50.00
Rails 3 ft and under	52.00 to 53.00
RR. steel springs	48.50 to 49.50
Steel car axles	48.50 to 49.50
Grate bars	60.00 to 62.00
Brake shoes	58.00 to 60.00
Malleable	71.00 to 72.00
Cast iron car wheels	61.00 to 62.00
No. 1 machinery cast	65.00 to 67.00
Hvy. breakable cast	58.00 to 59.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy, melting	.... $37.50
No. 2 hvy, melting	.... 37.50
No. 2 bundles	.... 37.50
No. 1 busheling	.... 37.50
Long turnings	$25.00 to 26.00
Shoveling turnings	27.00 to 28.00
Cast iron borings	26.00 to 27.00
Bar crops and plate	42.50 to 43.50
Structural and plate	42.50 to 43.50
No. 1 cupola cast.	64.00 to 67.00
Stove plate	55.00 to 58.00
No. 1 RR. hvy, melt.	38.50 to 40.00
Steel axles	38.00 to 39.00
Scrap rails	44.00 to 45.00
Rerolling rails	51.00 to 53.00
Angles & splice bars	51.00 to 53.00
Rails 3 ft & under	52.00 to 55.00
Cast iron carwheels	48.00 to 50.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$40.00 to $40.50
No. 2 hvy. melting	40.00 to 40.50
Mach. shop turn.	35.00 to 35.50
Short shov. turn.	37.00 to 37.50
Cast iron borings	36.00 to 36.50
Low phos.	45.00 to 45.50

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	.... $34.50
No. 2 hvy. melting	.... 34.50
No. 2 bundles	.... 34.50
Mach. shop turn.	$29.00 to 29.50
Mixed bor. & turn.	29.00 to 29.50
Shoveling turn.	31.00 to 32.00
No. 1 cupola cast.	55.00 to 56.00
Clean auto cast.	55.00 to 56.00
Hvy. breakable cast.	54.00 to 55.00
Charging box cast.	54.00 to 55.00
Unstrp. motor blks.	51.00 to 52.00
Cl'n cast chem. bor.	34.50 to 35.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.75 to $45.00
No. 2 hvy. melting	.... 39.75
No. 1 bundles	.... 39.75
No. 2 bundles	.... 39.75
No. 1 busheling	.... 39.75
Mach. shop turn.	34.75 to 35.00
Shoveling turn.	35.00 to 36.00
Cast iron borings	.... 35.75
Mixed bor. & turn.	.... 34.75
Mixed cupola cast.	62.00 to 64.00
Charging box cast.	56.00 to 57.00
Stove plate	62.00 to 64.00
Clean auto cast.	62.00 to 64.00
RR. malleable	70.00 to 75.00
Small indl. malleable	47.00 to 49.00
Low phos. plate	44.75 to 46.00
Scrap rails	50.00 to 52.00
Rails 3 ft & under	57.00 to 58.00
RR. steel wheels	51.00 to 52.00
Cast iron carwheels	51.00 to 52.00
RR. coil & leaf spgs.	51.00 to 52.00
RR. knuckles & coup.	51.00 to 52.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.50 to $40.00
No. 2 hvy. melting	39.50 to 40.00
No. 1 bundles	39.50 to 40.00
No. 1 busheling	39.50 to 40.00
Drop forge flashings	39.50 to 40.00
Mach. shop turn.	34.50 to 35.00
Shoveling turn.	35.50 to 36.00
Steel axle turn.	39.50 to 40.00
Cast iron borings	35.50 to 36.00
Mixed bor. & turn.	35.50 to 36.00
Low phos.	44.50 to 45.00
No. 1 machinery cast.	65.00 to 70.00
Malleable	75.00 to 77.00
RR. cast.	70.00 to 73.00
Railroad grate bars	60.00 to 62.00
Stove plate	60.00 to 62.00
RR. hvy. melting	40.00 to 40.50
Rails 3 ft & under	60.00 to 61.00
Rails 18 in. & under	61.00 to 62.00

SAN FRANCISCO

Per gross ton f.o.b. shipping point:

No. 1 hvy. melting	.... $25.00
No. 2 hvy. melting	.... 25.00
No. 2 bales	.... 25.00

Per gross ton delivered to consumer:

No. 3 bales	.... $19.00
Mach. shop turn.	.... 16.00
Elec. furn. 1 ft under	$32.00 to 34.00
No. 1 cupola cast.	.... 40.00
RR. hvy. melting	.... 26.00

LOS ANGELES

Per gross ton f.o.b. shipping point:

No. 1 hvy. melting	.... $25.00
No. 2 hvy. melting	.... 25.00
No. 1 bales	.... 25.00
No. 2 bales	.... 25.00
No. 3 bales	.... 19.00
Mach. shop turn.	.... 17.00
No. 1 cupola cast.	$40.00 to 42.00
RR. hvy. melting	.... 26.00

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melt.	.... $26.00
Elec. furn. 1 ft and under	.... 28.00
No. 1 cupola cast.	.... 40.00
RR. hvy. melting	.... 28.00

HAMILTON, ONT.

Per gross ton delivered to consumer: Cast grades f.o.b. shipping point.

Heavy melting	$22.00*
No. 1 bundles	22.00*
No. 2 bundles	21.50*
Mechanical bundles	20.00*
Mixed steel scrap	19.00*
Mixed borings and turnings	17.00*
Rails, remelting	28.00*
Rails, rerolling	26.00*
Bushelings	17.00*
Bushelings, new fact, prep'd	21.00*
Bushelings, new fact, unprep'd	16.00*
Short steel turnings	17.00*
No. 1 cast	$42.00 to 44.00
No. 2 cast	35.00 to 37.00

*Ceiling Price.

NONFERROUS METALS

. . . News and Market Activities

Lead

• • • **The strike at one** Mexican mine was settled last week after it had been closed down for nearly six weeks. Some members of the industry believe that were it not for these strikes and the Mexican smelter strikes that were concluded more than a month ago, the lead position here might be reasonably well in balance, in view of the more moderate requirements of the battery makers recently. However, the industry is unable to cope with the current pressure of consumer demand even at the current high price level.

In view of this market position, it is significant to learn of the developments at the meeting of the Lead, Bismuth, Antimony and Silver subcommittee of the Munitions Board at which Felix E. Wormser, assistant to the president of the St. Joseph Lead Co. urged that there be no strategic stockpiling of lead at this time. He said that increased competition for the limited supply, were the government to enter the market at this time would be sure to send the price of the metal upward. Mr. Wormser stated that wartime uses of lead for ammunition were small in the last war and quoted annual consumption figures ranging from a high point of 178,500 tons in 1943 to a low of 63,000 tons in the following year, and 58,000 tons in 1945. These figures were contrasted with domestic mine production of 425,000 tons and scrap production of 400,000 tons a year. The mine production potential of Canada and Mexico were estimated at 175,000 tons and 200,000 tons respectively. Wartime requirements of lead could be quickly diverted, he said, from the normal peacetime consumption.

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Zinc

• • • **The price of** zinc remains unchanged except for the new freight rates as the Joplin ore price has not yet been increased, although talk among producers reported in the trade is still in the direction of higher prices. Reports from Joplin indicate that producers are talking of a zinc price increase of the order of 2¢ to 3¢ per lb in order to bring the metal into line with the price of lead. The report goes on to state that the Tri-State concentrates market is tightening because of the reluctance of the high cost operators to sell at the $78 price for concentrates. All factors are waiting expectantly to see how the subsidy legislation fares in Congress. During the week, three new bills providing for premium payments to small producers of copper, lead, zinc, manganese and chrome have been introduced into the House. Offered by Representatives Wilber D. Mills (Ark.) HR-6456; Fred L. Crawford (Mich.) HR-6403; and Ben F. Jensen (Iowa) HR-6390, all bills provide for the expenditure of $100 million in the fiscal year 1949. Meanwhile, the Russell bill has not yet reached the floor of the House.

•

Copper

• • • **Producers opened** up their books for June delivery last week but there is no let-up in demand for copper. There has been some easing in the pressure from brass mills and wire mills, but foreign demand has been growing rapidly with the prospects of CA funds. Producers have seen the foreign copper market resume activity well in advance of the receipt of dollar funds. Major producers are holding the weighted average export price down to slightly more than the domestic market price, despite sales that are reported as high as 22.00¢ f.a.s. New York. So far there has been no evidence of moves to increase production abroad which was proposed to compensate for the increased foreign demand which could be expected as a result of the ERP. Rhodesia has been attempting to step up its copper production and in that connection has started to import coal from the United States. T. Stannard, president of Kennecott Copper Corp. in a statement to stockholders at the annual meeting estimated that some 12,000 to 15,000 tons of copper a month are to go to Europe from South America. He also said that the company would oppose any increase in the price of copper above the 21.50¢ level, a position that is well known in the trade and applies also to other major producers of copper.

•

Aluminum Ingots

• • • **The secondary aluminum** ingot market has grown increasingly tight due to a shortage in the supply of scrap and continued activity in buying. Business is being done only at the high side of the ranges quoted last week and ingot makers are taking orders only from their established consumers. This latter development is due to the fact that producers do not have sufficient metal to supply the fall demand. In the light of this situation it is forecast in some quarters that price increases in secondary aluminum are expected very soon.

•

Republic Steel Sells Assets Of Subsidiary

Cleveland

• • • **Republic Steel** Corp. has sold properties and assets of its subsidiary, Republic Supply Co., Houston, Texas, and of the majority interest owned by Republic Steel Corp. in Howard Supply Co. of Los Angeles. These companies operate oil country supply stores and pipe yards in the Southwest and on the Pacific Coast.

The purchasers will continue to act as distributors for Republic electric weld casing and tubing, electric weld line pipe, and butt weld pipe.

Nonferrous Metals Prices

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	May 5	May 6	May 7	May 8	May 10	May 11
Copper, electro, Conn.	21.50	21.50	21.50	21.50	21.50	21.50
Copper, Lake, Conn.	21.625	21.625	21.625	21.625	21.625	21.625
Tin, Straits, New York	94.00	94.00	94.00	94.00	94.00	94.00
Zinc, East St. Louis	12.00	12.00	12.00	12.00	12.00	12.00
Lead, St. Louis	17.30	17.30	17.30	17.30	17.30	17.30

Primary Metals

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, 10,000 lb, f.o.b shipping point, freight allowed.... 15.00
Aluminum pig, f.o.b. shipping point 14.00
Antimony, American, Laredo, Tex... 33.00
Beryllium copper, 3.75-4.25% Be dollars per lb contained Be.....$20.50
Beryllium aluminum 5% Be, dollars per lb contained Be.....$40.00
Cadmium, del'd $1.75
Cobalt, 97-99% (per lb).....$1.65 to $1.72
Copper electro, Conn. Valley..... 21.50
Copper, lake, Conn. Valley.....21.625
Gold, U. S. Treas., dollars per oz...$35.00
Indium, 99.8%, dollars per troy oz... $2.25
Iridium, dollars per troy oz...$105 to $115
Lead, St. Louis 17.30
Lead, New York 17.50
Magnesium, 99.8+%, f.o.b. Freeport, Tex. 20.50
Magnesium, sticks, carlots..... 34.50
Mercury, dollars per 76-lb flask, f.o.b. New York.....$76.50 to $77
Nickel, electro, f.o.b. New York.... 36.56
Palladium, dollars per troy oz.....$24.00
Platinum, dollars per troy oz...$98 to $101
Silver, New York, cents per oz.....74.625
Tin, Grade A, New York..... 94.00
Zinc, East St. Louis..... 12.00
Zinc, New York 12.65
Zirconium copper, 6 pct Zr, per lb contained Zr. $8.75

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot
No. 115 ..... 19.25
No. 120 ..... 18.75
No. 123 ..... 18.25
80-10-10 ingot
No. 305 ..... 24.25
No. 315 ..... 21.75
88-10-2 ingot
No. 210 ..... 30.00
No. 215 ..... 28.00
No. 245 ..... 22.25–22.75
Yellow ingot
No. 405 ..... 15.25–16.00
Manganese bronze
No. 421 ..... 18.00

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys
0.30 copper, max. 20.75
0.60 copper, max. 20.50
Piston alloys (No. 122 type).. 18.75
No. 12 alum. (No. 2 grade)... 18.25
108 alloy 18.50
195 alloy 19.00
13 alloy 20.75
AXS-679 ..... 18.75

Steel deoxidizing aluminum, notch-bar granulated or shot
Grade 1—95 pct-95½ pct..... 19.00
Grade 2—92 pct-95 pct..... 18.50
Grade 3—90 pct-92 pct..... 18.00
Grade 4—85 pct-90 pct..... 17.50

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed
Cast, oval, 15 in. or longer..... 37⅝
Electrodeposited 32⅜
Rolled, oval, straight, delivered... 33.09
Brass, 80-20, frt. allowed
Cast, oval, 15 in. or longer..... 33⅜
Zinc, cast, 99.99 ..... 20.50
Nickel 99 pct plus, frt. allowed
Cast 51
Rolled, depolarized 52
Silver 999 fine
Rolled, 1000 oz lots per troy oz... 67¼

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum..... 43.00
Copper sulfate, 99.5, crystals, bbls.. 11.50
Nickel salts, single, 425 lb bbls. frt. allowed 14.50
Silver cyanide, 100 oz. lots, per oz. 54.00
Sodium cyanide, 96 pct domestic, 100 lb drums 15.00
Zinc cyanide, 100 lb drums..... 34.00
Zinc sulfate, 89 pct, granules, bbls, frt. allowed 7.75

Mill Products

Aluminum

(Base prices, cents per pound, base 30,000 lb., f.o.b. shipping point, freight allowed.)

Flat Sheet: 0.188 in., 2S, 3S, 24¢; 4S, 61S-O, 25.8¢; 52S, 27.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢. **0.081 in.**; 2S, 3S, 25¢; 4S, 61S-O, 27.1¢; 52S, 29¢; 24S-O, 24S-OAL, 27.7¢; 75S-O, 75S-OAL, 34.3¢. **0.032 in.**; 2S, 3S, 26.4¢; 4S, 61S-O, 30.1¢; 52S, 32.6¢; 24S-O, 24S-OAL, 34.2¢; 75S-O, 75S-OAL, 43.1¢.

Plate: ¼ in. and heavier; 2S, 3S, 21.2¢; 4S-F, 23.2¢; 52S, 24.2¢; 61S-O, 23.8¢; 24S-F,24S-FAL, 24.2¢; 75S, 75S-AL, 30.5¢.

Extruded Solid Shapes: Shape factors **1 to 4**; 31¢ to 59¢; **11 to 13**, 31.9¢ to 69¢; **23 to 25, 33.4¢ to 90¢; 35 to 37**, 40.8¢ to $1.25; **47 to 49**, 58.7¢ to $1.84.

Extruded Round Rod, Square, Hex, Octagonal Bar: ¼ in. and over, 27¢ to 38¢; ½ to ¾ in., 28¢ to 40.5¢; ⅜ to ½ in., 29c to 43c; ¼ to ⅜ in., 30¢ to 46.5¢; ⅞ to ⅔ in., 32.5¢ to 53.5¢; 9/64 to ⅔ in., 35.5¢ to 62¢.

Rolled Rod: 1.064 to 4.5 in., 2S, 3S, 30¢ to 26.5¢; Cold-finished rod, 0.375 to 3.5 in., 2S, 3S, 32¢ to 28¢.

Screw Machine Stock: Drawn, ½ to ⅛ in., 11S-T3, 34¢ to 45¢; cold-finished, ⅜ to 1½ in., 11S-T3, 33¢ to 31¢; rolled, 1⅞ to 3 in., 11S-T3, 31¢ to 28.5¢.

Drawn Wire: coiled, 0.051 to 0.374 in.; 2S, 33¢ to 24¢ 52S, 40.5c to 29c; 56S, 42.5¢ to 34.5¢; 17S-T4, 46¢ to 31¢; 61S-T4, 41c to 30.5c; 75S-T6, 66¢ to 46¢.

Magnesium

(Cents per lb, f.o.b. mill, freight allowed. Base quantity 30,000 lb.)

Sheet and Plate: Ma. FSa. ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58c-60c; 10, 59c-61c; 12, 63-65c; 14, 69c-74c; 16, 76c-81c; 18, 84c-89c 20, 96c-$1.01; 22, $1.22-$1.31; 24, $1.62-$1.75. Specification grade higher.

Round Rod: M, diam., in., ¼ to ⅜, 47¢; ½ to ¾, 45¢; 1¼ to 2½, 43.5¢; 3½ to 5, 42.5¢. Other alloys higher.

Square, Hexagonal Bar: M, size across flats, in., ¼ to ⅜, 52.5¢; ½ to ¾, 47.5¢; 1¼ to 2½, 45¢; 3½ to 5, 44¢. Other alloys higher.

Solid Shapes, Rectangles: M, form factors, 1 to 4, 46¢; 11 to 13, 49¢; 20 to 22, 51.5¢; 29 to 31, 59.5¢; 38 to 40, 75.5¢; 47 to 49, 98¢. Other alloys higher.

Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to ⅞, $1.21; ⅞ to ⅜, $1.12; ⅜ to ⅞, 97¢; 0.058 to 0.064, ⅞ to ½, 89¢; ½ to ⅝, 81¢; 0.065 to 0.082, ⅝ to ¾, 76¢; ¾ to 1, 72¢; 0.083 to 0.108, 1 to 2, 68¢; 0.165 to 0.219, 2 to 3, 59¢; 3 to 4, 57¢. Other alloys higher.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets		41
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks		31

Copper, Brass, Bronze

(Cents per pound, freight prepaid on 200 lb)

	Extruded Shapes	Rods	Sheets
Copper	33.53	....	33.68
Copper, hot-rolled	....	30.03	....
Copper, drawn	....	31.03	....
Low brass	34.36*	31.39	31.70
Yellow brass	32.92*	29.85	30.16
Red brass	34.89*	31.92	32.23
Naval brass	30.28	29.03	34.97
Leaded brass	28.64	24.69	....
Commercial bronze	35.68*	32.96	33.27
Manganese bronze	33.87	32.37	38.47
Phosphor bronze, 5 pct	53.95*	52.95	52.70
Muntz metal	29.80	28.55	32.99
Everdur, Herculoy, Olympic, etc.	37.24	37.50	38.56
Nickel silver, 10 pct.	41.80	42.68	40.54
5 pct	....	....	38.98
Architectural bronze	28.61	....	....

*Seamless tubing.

Scrap Metals

Brass Mill Scrap

(Cents per pound; add 1¢ per lb for shipments of 15,000 lb or more.)

	Heavy	Turnings
Copper	19⅛	18⅝
Yellow brass	15⅝	14⅝
Red brass	17½	16⅝
Commercial bronze	17⅝	16⅝
Manganese bronze	15¼	14⅝
Leaded brass rod ends	15¾	....

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery.)

No. 1 copper, wire..... 18.75–19.00
No. 2 copper, wire..... 17.75–18.00
Light copper 16.75–17.75
Refinery brass 16.50–16.75*
*Dry copper content.

Ingot Makers' Scrap

(Cents per pound, carload lots, delivered to producer.)

No. 1 copper, wire..... 18.25
No. 2 copper, wire 17.25
Light copper 16.25
No. 1 composition..... 15.25
No. 1 comp. turnings..... 14.75
Rolled brass 11.50
Brass pipe 12.00
Radiators 12.00
Heavy yellow brass..... 11.25

Aluminum

Mixed old cast 10.00
Mixed old clips 9.50
Mixed turnings 5.50
Pots & pans 10.25
Low copper 10.50–10.75

Dealers' Scrap

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Copper and Brass

No. 1 heavy copper and wire.. 16½—17
No. 2 heavy copper and wire.. 15½—16
Light copper ..... 14¼—14⅝
Auto radiators (unsweated)... 10 —10½
No. 1 composition ..... 12¾—13
No. 1 composition turnings.... 12¼—12⅝
Clean red car boxes..... 9⅝—10⅛
Cocks and Faucets ..... 10 —10½
Mixed heavy yellow brass..... 8 — 8½
Old rolled brass ..... 9½—10
Brass pipe ..... 10 —10½
New soft brass clippings..... 12¼—12⅝
Brass rod ends ..... 10 —10½
No. 1 brass rod turnings..... 9½—10

Aluminum

Alum. pistons with struts.... 4½— 5
Aluminum crankcases ..... 7½— 8
2S aluminum clippings ..... 9 — 9½
Old sheet & utensils ..... 7½— 8
Dry borings and turnings..... 3 — 3½
Misc. cast aluminum ..... 7½— 8
Dural clips (24S) ..... 7½— 8

Zinc

New zinc clippings ..... 8 — 8½
Old zinc ..... 5½— 5⅝
Zinc routings ..... 3 — 3½
Old die cast scrap..... 4 — 4½

Nickel and Monel

Pure nickel clippings ..... 16 —17
Clean nickel turnings ..... 12½—13
Nickel anodes ..... 16 —17
Nickel rod ends ..... 16 —17
New Monel clippings ..... 12 —13
Clean Monel turnings ..... 7 — 8
Old sheet Monel ..... 10 —10½
Old Monel castings ..... 7½— 8
Inconel clippings ..... 8 — 8½
Nickel silver clippings, mixed 8 — 8½
Nickel silver turnings, mixed 6½— 7

Lead

Soft scrap lead ..... 14½—15
Battery plates (dry) ..... 9 — 9¼

Magnesium Alloys

Segregated solids ..... 8 — 9
Castings ..... 4½— 5½

Miscellaneous

Block tin ..... 75 —77
No. 1 pewter ..... 60 —62
No. 1 auto babbitt ..... 45 —47
Mlexed common babbitt ..... 14¼—14⅝
Solder joints ..... 17⅛—17⅝
Siphon tops ..... 45 —47
Small foundry type ..... 17½—18
Monotype ..... 16¼—16⅝
Lino. and stereotype ..... 15½—15⅝
Electrotype ..... 12½—13
New type shell cuttings..... 14½—15
Hand picked type shells..... 6½— 7
Lino and stereo dross..... 8 — 8½
Electro dross ..... 6 — 6½

Comparison of Prices . .

Advances over past week in Heavy Type, declines in *Italics*. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Steel prices on this page are the average of various f.o.b. quotations at major producing centers: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Flat-Rolled Steel: (cents per pound)	May 11, 1948	May 4, 1948	Apr. 13, 1948	May 13, 1947
Hot-rolled sheets	2.775	2.775	2.80	2.50
Cold-rolled sheets	3.495	3.495	3.55	3.20
Galvanized sheets (10 ga.)	3.906	3.906	3.95	3.55
Hot-rolled strip	2.775	2.775	2.80	2.50
Cold-rolled strip	3.535	3.535	3.55	3.20
Plates	2.925	2.925	2.95	2.65
Plates wrought iron	7.25	7.25	7.25	5.95
Stain's c-r strip (No. 302)	30.50	30.50	30.50	30.50
Tin and Terneplate: (dollars per base box)				
Tinplate (1.50 lb) cokes..	$6.70	$6.70	$6.80	$5.75
Tinplate, electro (0.50)lb)	5.90	5.90	6.00	5.05
Special coated mfg. ternes	5.80	5.80	5.90	4.90
Bars and Shapes: (cents per pound)				
Merchant bars	2.875	2.875	2.90	2.60
Cold-finished bars	3.483	3.483	3.55	3.20
Alloy bars	3.213	3.213	3.30	3.05
Structural shapes	2.767	2.767	2.80	2.50
Stainless bars (No. 302)	26.00	26.00	26.00	26.00
Wrought iron bars	8.65	8.65	8.65	6.15
Wire: (cents per pound)				
Bright wire	3.608	3.608	3.55	3.30
Rails: (dollars per 100 lb)				
Heavy rails	$2.70	$2.70	$2.75	$2.50
Light rails	3.05	3.05	3.10	2.85
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$45.00†	$45.00†	$45.00†	$42.00
Slabs, rerolling	45.00†	45.00†	45.00†	42.00
Forging billets	54.00†	54.00†	54.00†	50.00
Alloy blooms, billets, slabs	66.00	66.00	66.00	61.00
Wire Rods and Skelp: (cents per pound)				
Wire rods	3.025*	3.025*	3.025*	2.55
Skelp	2.887	2.90	2.90	2.35

†Net ton *Revised

Pig Iron: (per gross ton)	May 11, 1948	May 4, 1948	Apr. 13, 1948	May 13, 1947
No. 2, foundry, Phila.	$44.85	$44.61	$44.61	$36.51
No. 2, Valley furnace	39.50	39.50	39.50	33.50
No. 2, Southern Cin'ti	43.97	43.28	43.28	34.75
No. 2, Birmingham	37.38	37.38	37.38	29.88
No. 2, foundry, Chicago†	39.00	39.00	39.00	33.00
Basic del'd Philadelphia	44.35	44.11	44.11	36.92
Basic, Valley furnace	39.00	39.00	39.00	33.00
Malleable, Chicago†	39.50	39.50	39.50	33.50
Malleable, Valley	39.50	39.50	39.50	33.50
Charcoal, Chicago	62.55	62.46	62.46	45.99
Ferromanganese‡	145.00	145.00	145.00	135.00

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$40.25	$40.25	$40.25	$29.75
Heavy mlt'g steel, Phila.	42.50	41.75	41.50	29.50
Heavy melt'g steel, Ch'go	39.25	39.25	39.25	29.25
No. 1, hy, comp. sh't, Det.	35.50	35.50	35.50	26.00
Low phos. Young'n	45.25	45.25	45.25	35.75
No. 1, cast, Pittsburgh	64.00	64.00	64.00	37.50
No. 1, cast, Philadelphia	65.50	65.50	65.50	41.00
No. 1, cast, Chicago	73.50	71.50	74.00	37.25
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$12.50	$12.50	$12.50	$10.50
Foundry coke, prompt	14.00	14.00	14.00	11.25
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro, Conn.	21.50	21.50	21.50	21.50
Copper, Lake Conn.	21.625	21.625	21.625	21.625
Tin, Grade A, New York	94.00	94.00	94.00	80.00
Zinc, East St. Louis	12.00	12.00	12.00	10.50
Lead, St. Louis	17.30	17.30	17.30	14.80
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	36.56	36.56	36.56	37.67
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	33.00	33.00	33.00	33.00

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942, and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite price for the current quarter is an estimate based on finished steel shipments for the previous quarter. This figure will be revised when shipments for this quarter are compiled.

	FINISHED STEEL (Base Price)	PIG IRON	SCRAP STEEL
May 11, 1948	3.20798¢ per lb.	$40.24 per gross ton	$40.66 per gross ton
One week ago	3.20798¢ per lb.	$40.11 per gross ton	$40.42 per gross ton
One month ago	3.23940¢ per lb.	$40.11 per gross ton	$40.33 per gross ton
One year ago	2.85664¢ per lb.	$33.15 per gross ton	$29.58 per gross ton

	HIGH	LOW
1948	3.23940¢ Feb. 17	3.20798¢ May 4
1947	3.19541¢ Oct. 7	2.87118¢ Jan. 7
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5
1943	2.29176¢	2.29176¢
1942	2.28249¢	2.28249¢
1941	2.43078¢	2.43078¢
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16
1939	2.35367¢ Jan. 3	2.26689¢ May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2
1933	1.95578¢ Oct. 3	1.75836¢ May 2
1932	1.89196¢ July 5	1.83901¢ Mar. 1
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue.

	HIGH	LOW
1948	$40.37 Feb. 17	$39.58 Jan. 6
1947	37.98 Dec. 30	30.14 Jan. 7
1946	30.14 Dec. 10	25.37 Jan. 1
1945	25.37 Oct. 23	23.61 Jan. 2
1944	$23.61	$23.61
1943	23.61	23.61
1942	23.61	23.61
1941	$23.61 Mar. 20	$23.45 Jan. 2
1940	23.45 Dec. 23	22.61 Jan. 2
1939	22.61 Sept. 19	20.61 Sept. 12
1938	23.25 June 21	19.61 July 6
1937	23.25 Mar. 9	20.25 Feb. 16
1936	19.74 Nov. 24	18.73 Aug. 11
1935	18.84 Nov. 5	17.83 May 14
1934	17.90 May 1	16.90 Jan. 27
1933	16.90 Dec. 5	13.56 Jan. 3
1932	14.81 Jan. 5	13.56 Dec. 6
1931	15.90 Jan. 6	14.79 Dec. 15
1930	18.21 Jan. 7	15.90 Dec. 16
1929	18.71 May 14	18.21 Dec. 17

Based on averages for basic iron at valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	HIGH	LOW
1948	$41.83 Jan. 29	$39.75 Mar. 9
1947	42.58 Oct. 28	29.50 May 20
1946	31.17 Dec. 24	19.17 Jan. 1
1945	19.17 Jan. 2	18.92 May 22
1944	19.17 Jan. 11	15.76 Oct. 24
1943	$19.17	$19.17
1942	19.17	19.17
1941	$22.00 Jan. 7	$19.17 Apr. 10
1940	21.83 Dec. 30	16.04 Apr. 9
1939	22.50 Oct. 3	14.08 May 16
1938	15.00 Nov. 22	11.00 June 7
1937	21.92 Mar. 30	12.67 June 9
1936	17.75 Dec. 21	12.67 June 8
1935	13.42 Dec. 10	10.33 Apr. 29
1934	13.00 Mar. 13	9.50 Sept. 25
1933	12.25 Aug. 8	6.75 Jan. 3
1932	8.50 Jan. 12	6.43 July 5
1931	11.33 Jan. 6	8.50 Dec. 29
1930	15.00 Feb. 18	11.25 Dec. 9
1929	17.58 Jan. 29	14.08 Dec. 8

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points in cents per pound unless otherwise indicated. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of deliverd prices at major ports. (1) Commercial quality sheet grade; primes, 0.25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Cokes, 1.25 lb, deduct 20¢ per base box. (6) 18 gage and heavier. (7) For straight length material only from producers to fabricators. (8) Also shafting. For quantities of 40,000 lb & over. (9) Carload lot in manufacturing trade. (10) Arbitrary delivered prices. (11) Hollowware enameling, gages 29 to 31 only. (12) Produced to dimensional tolerances in AISI Manual Sec. 6. (13) Delivered San Francisco only. (14) Kaiser Co. prices (15) from 0.035 to 0.075 in. thick by ¾ to 3½ in. wide. (16) Deliverd Los Angeles; add 0.55¢ per 100 lb for San Francisco. (17) Slab prices subject to negotiation in most cases.

PRODUCTS	BASING POINTS												DELIVERED TO		
	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio		San Francisco, Los Angeles	Detroit[10]	New York	Philadelphia
INGOTS Carbon forging	$40.00	Rerolling ingots—$36.00 per net ton f.o.b. mill (Spot market as $75 to $90 per gross ton)													
Alloy	$56.00										Canton = $56.00				
BILLETS, BLOOMS, SLABS Carbon, rerolling[17]	$45.00	$45.00	$45.00	$47.00	$45.00	$45.00		$45.00							
Carbon forging billets	$54.00	$54.00	$54.00	$54.00	$54.00	$54.00	(per net ton)								
Alloy	$66.00	$66.00				(Bethlehem, Massillon, Canton = $66.00)									
PIPE SKELP	2.85 to 2.90						2.90								
WIRE RODS	2.80 to 3.55	2.80 to 3.80	2.80	2.80 to 3.05	2.85						Worcester = 2.90	3.5245[13]			
SHEETS Hot-rolled[1]	2.75 to 2.80	2.75	2.75	2.80	2.75	2.80	2.75 to 2.80	2.80		Ashland, Ky. = 2.80		3.494[16] to 3.6875	2.91 to 3.01		
Cold-rolled[1]	3.45 to 3.50	3.45 to 3.55	3.45	3.50		3.55	3.55		3.65	3.55			3.71 to 3.76		
Galvanized (10 gage)	3.85	3.95	3.85 to 3.95		3.95		3.95	3.95	4.05	3.95	Ashland = 3.95	4.624[16]	4.11 to 4.16		
Enameling (12 gage)	3.65	3.75	3.75 to 3.85	3.95			3.95		4.05	3.95			4.11 to 4.16		
Long ternes[2] (10 gage)	4.05		4.05												
STRIP Hot-rolled[1]	2.80	2.75 to 2.80	2.75	2.75 to 2.80	2.75		2.75 to 2.80					3.554[16] to 3.9125	2.96 to 3.01		
Cold-rolled[1]	3.50	3.55 to 3.65	3.55	3.45 to 3.50			3.55			Worcester = 3.65)			3.71 to 3.76		
TINPLATE Cokes, 1.50 lb,[5] base box	6.70	6.70	6.70		6.60			6.60	6.90	(Warren, Ohio = $6.80)					
Electrolytic 0.25, 0.50, 0.75 lb, box	Deduct $1.00, 80¢ and 60¢ respectively from 1.50 lb coke base box price.														
TERNES, MFG., special coated	Deduct 90¢ from 1.50 lb coke base box price.														
BLACKPLATE, CANMAKING 55-70 lb, 75-95 lb, 100-128 lb	Deduct $1.60, $1.70 and $1.60 respectively from 1.50 lb coke base box price.														
BLACKPLATE, h.e., 29 ga.[11]	4.65	4.65	4.65					4.75	4.85						
BARS Carbon Steel	2.85 to 2.90	2.85 to 2.90	2.85	2.90	2.85	2.90	2.85 to 2.90					3.579[16] to 3.629[16]			
Reinforcing (billet)[7]	2.70 to 2.80	2.70 to 2.80	2.70		2.70		2.70					3.325[16]			
Cold-finished[4]	3.45 to 3.55	3.45 to 3.55		3.45									3.71 to 3.76		
Alloy, hot-rolled	3.20	3.20 to 3.30	3.20			3.30	3.20	Bethlehem, Massillon, Canton = 3.30							
Alloy, cold-drawn	4.00 to 4.10	4.00 to 4.10		4.00		4.10		Massillon, Canton = 4.10							
PLATE Carbon steel[12]	2.90 to 2.95	2.90 to 2.95	2.90 to 2.95	2.95	2.90		2.90	Coatesville = 3.45, Claymont = 3.65 Geneva, Utah = 2.90				3.8375[16]			
Floor plates	4.05	3.95 to 4.05	3.95	4.05											
Alloy	3.70	3.70	3.70						Coatesville = 4.80						
SHAPES, Structural	2.75	2.75 to 2.80	2.75 to 2.80		2.75		Bethlehem = 2.80, Geneva, Utah = 2.75					3.424[16] to 3.49			
MANUFACTURERS' WIRE[9] Bright	3.45 to 3.80	3.45		3.45	3.45					Worcester = 3.55 Duluth = 3.50		4.4645[13]			
Spring (high carbon)	4.50	4.50		4.50					Worcester = 4.60 Trenton, Duluth = 4.75			5.5345[13]			
PILING, Steel sheet	3.30	3.30				3.30									

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

Basing Point	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 448
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt.	Subject to negotiation			Subject to negotiation		
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	Subject to negotiation			Subject to negotiation		
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt, Beth.	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Water, Syracuse, Ft. Wayne, Titusville, Beth, Brackenridge	23.00	22.50	17.50	17.50	21.00	25.50
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville, Beth, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet, Beth, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Plates, P'gh, Middletown, Canton, Brackenridge, Balt, Coatesville	31.50	29.50	23.50	24.00	28.00	33.00
Shapes, structural, P'gh, Chi, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Sheets, P'gh, Chi, Middletown, Canton, Balt, Brackenridge	39.00	37.00	29.00	31.50	35.50	39.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.50	23.50	18.50	19.00	28.00	38.00
Strip, c-r, P'gh, Cleve, Jersey City, Reading, Canton, Youngstown, Balt, W. Leechburg	32.50	30.50	24.00	24.50	35.00	58.50
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila, Ft. Wayne, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton, W. Leechburg	32.46	30.30	23.80	24.34	34.82	56.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	28.75
Tubing, seamless, P'gh, Chi, Canton, Brackenridge, Milwaukee	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

*(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, Ohio)*

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	.... 82¢
18	4	1	—	5	....$1.29
18	4	2	—	—	.... 93¢
1.5	4	1.5	8	—	.... 59¢
6	4	2	6	—	.... 63¢

High-carbon-chromium* ..... 47¢
Oil hardening manganese* ..... 26¢
Special carbon* ..... 24¢
Extra carbon* ..... 20¢
Regular carbon* ..... 17¢

Warehouse prices on and east of Mississippi are 2¢ per lb higher; west of Mississippi, 4¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	Per lb
Armature	4.70¢ to 5.05¢
Electrical	5.20¢ to 5.45¢
Motor	5.95¢ to 6.30¢
Dynamo	6.65¢ to 7.50¢
Transformer 72	7.15¢ to 8.25¢
Transformer 65	7.85¢ to 9.20¢
Transformer 58	8.55¢ to 9.90¢
Transformer 52	9.35¢ to 9.70¢

F.o.b. Chicago and Gary: armature through motor only. F.o.b. Granite City add to lower quotation 0.55¢ for armature through and including 72, and 0.45¢ for balance.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb
No. 1 O.H., per 100 lb. $2.70
Angle splice bars, 100 lb. 3.75
Light rails (from billets) per 100 lb. 3.05

	Base per lb
Cut spikes	4.85¢
Screw spikes	6.90¢
Tie plate, steel	3.55¢
Tie plates, Pittsburg, Calif.	3.70¢
Track bolts	7.00¢
Track bolts, heat treated, to railroads	7.25¢

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$7.05	$14.10

CLAD STEEL

Base prices, cents per pound

Stainless-clad	Plate	Sheet
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Fa.	*24.00	*22.00
Nickel-clad 10 pct, f.o.b. Coatesville, Pa.	21.50	....
Inconel-clad 10 pct, f.o.b. Coatesville	30.00	....
Monel-clad 10 pct, f.o.b. Coatesville	24.00	....
Aluminized steel Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

* Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer, f.o.b. Pittsburgh, Chicago, Birmingham

	Base	Column San Francisco
Standard & coated nails*	91	112
Galvanized nails*	91	112
Woven wire fence†	97	120
Fence posts, carloads†† ..	104	...
Single loop bale ties	94	118
Galvanized barbed wire**	111	131
Twisted barbless wire ..	111	...

* Also Duluth; Worcester, 6 columns higher. † 15½ gage and heavier. ** On 80-rod spools, in carloads. †† Duluth only.

	Base per 100 lb	San Francisco
Annealed fence wire‡	$4.10	$5.1145
Annealed, galv. fencing‡	4.55	5.5645
Cut nails, carloads‡‡	6.15	...

‡ Add 10¢ at Worcester. ‡‡ Pittsburgh only, less 20¢ to jobbers.

HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

Steel	Alde-cor	Corten	Double Strength No. 1	Dyn-alloy	HI Steel	Mayari R	Otis-coloy	Yoloy	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	Great Lakes Steel
Plates	4.55	4.45	4.55	4.55	4.45	4.55	4.45	4.55	4.55
Sheets									
Hot-rolled	4.30	4.20	4.30	4.30	4.20	4.30	4.20	4.30	4.30
Cold-rolled	5.30	5.20	5.30	....	5.20	5.30	5.20	5.30	5.30
Galvanized		5.90	....	....	5.90	6.00	....	....	....
Strip									
Hot-rolled	4.30	4.20	4.30	...	4.20	4.30	4.20	4.30	4.30
Cold-rolled	....		5.30	....	....	5.30	5.30	5.30	5.30†
Shapes	....	4.20	..	....	4.20	4.30	4.20	4.30	....
Beams	....	4.20	....	....	4.20	4.30	....	....	....
Bars									
Hot-rolled	4.45	4.35	4.45	....	4.35	4.45	4.35	4.45	4.45
Bar shapes	....	4.35	....	....	4.35	4.45	4.35	4.45	....

† Pittsburgh, add 0.10¢ at Chicago and Gary.

PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh and Lorain, steel buttweld and seamless. Others f.o.b. Pittsburgh only

Base price, $200.00 per net ton

Some producer allows 1 point less discount on steel buttweld.

Standard, threaded & coupled

Steel, buttweld	Black	Galv.
⅛-in.	48	30½
¼-in.	51	34½
1-in.	53½	37½
1¼-in.	54	38
1½-in.	54½	38½
2-in.	55	39
2½ and 3-in.	55½	39½
Wrought Iron, buttweld		
⅛-in.	+11	+35
¼-in.	+ 1½	+25
1 and 1¼-in.	4	+16½
1½-in.	9½	+13
2-in.	10	+12½
Steel, lapweld		
2-in.	44½	28
2½ and 3-in.	48½	32
3½ to 6-in.	50½	34
Steel, seamless		
2-in.	43½	27
2½ and 3-in.	46½	30
3½ to 6-in.	48½	32
Wrought Iron, lapweld		
2-in.	1½	+20
2½ to 3½-in.	4	+16
4-in.	8	+10½
4½ to 8-in.	6	+12

Extra Strong, plain ends

Steel, buttweld		
½-in.	46	30
¾-in.	50	34
1-in.	52	37
1¼-in.	52½	37½
1½-in.	53	38
2-in.	53½	38½
2½ and 3-in.	54	39
Wrought Iron, buttweld		
½-in.	+ 6½	+29
¾-in.	+ ½	+23
1 and 1¼ in.	4	+16½
2-in.	10	+12½
Steel, lapweld		
2-in.	43½	28
2½ and 3-in.	48½	33
3½ to 6-in.	52	36½
Steel, seamless		
2-in.	42½	27
2½ and 3-in.	46½	31
3½ and 6-in.	50	34½
Wrought Iron, lapweld		
2-in.	4½	+16½
2½ to 4-in.	13	+ 6
4½ to 6-in.	9	+10½

Basing discounts for standard pipe are for threads and couplings. For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all buttweld. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft, f.o.b. Pittsburgh in carload lots, cut length 4 to 24 ft, inclusive.

OD in in.	Gage BWG	Seamless Hot-Rolled	Seamless Cold-Drawn	Electric Weld Hot-Rolled	Electric Weld Cold-Drawn
2	13	$17.84	$20.99	$17.20	$20.36
2½	12	23.99	28.21	23.27	27.36
3	12	26.68	31.40	25.88	30.46
3½	11	33.35	39.26	32.35	38.08
4	10	41.40	48.70	40.16	47.24

CAST IRON WATER PIPE

Per net ton

6-in. to 24-in. del'd Chicago $91.12
3-in. to 24-in. del'd New York 89.18
3-in. to 24-in., Birmingham 79.50
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles for all rail shipment; rail and water shipment less 105.90

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts f.o.b Pittsburgh, Cleveland, Birmingham or Chicago)

Base discount less case lots

Machine and Carriage Bolts

Percent Off List

½ in. & smaller x 6 in. & shorter ... 45
9/16 & ⅝ in. x 6 in. & shorter 46
¾ in. & larger x 6 in. & shorter 43
All diam, longer than 6 in. 41
Lag, all diam over 6 in. long 44
Lag, all diam x 6 in. & shorter 46
Plow bolts 54

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller 43
9/16 to 1 in. inclusive 42
1⅛ to 1½ in. inclusive 40
1⅝ in. and larger 35

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	USS	SAE
7/16 in. and smaller	..	46
½ in. and smaller	44	..
½ in. through 1 in.	..	44
9/16 in. through 1 in.	43	..
1⅛ in. through 1½ in.	41	42
1⅝ in. and larger	35	..

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

Packages, nuts separate ..... 65 and 10
In bulk 75

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets (½ *in. and larger*)

Base per 100 lb

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $5.65
F.o.b. Lebanon, Pa. 5.80

Small Rivets (7/16 *in. and smaller*)

Percent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham 55

Cap and Set Screws

(In packages) *Percent Off List*

Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright 53
¾ to 1 in. x 6 in., SAE 1035, heat treated 44
Set screws, oval points 57
Milled studs 29
Flat head cap screws, listed sizes ... 16
Fillister head cap, listed sizes 37

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Metallurgical grade, f.o.b. producing plant.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$35.00
65% but less than 70%	34.00
60% but less than 65%	33.00
Less than 60%	32.00

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports*)

Per Gross Ton

Old range, bessemer $6.60
Old range, nonbessemer 6.45
Mesabi, bessemer 6.35
Mesabi, nonbessemer 6.20
High phosphorus 6.20

Increases or decreases in freight rates, dock handling charges and taxes after Apr. 1, 1948, are to be added to above prices.

METAL POWDER

Per pound, f.o.b. shipping point, in ton lots for minus 100 mesh.

Swedish sponge iron c.i.f. New York, ocean bags ..... 7.9¢ to 9.0¢
Domestic sponge iron, 98+% Fe ..... 9.5¢ to 16.0¢
Electrolytic iron, annealed, 99.5+% Fe ..... 19.5¢ to 39.5¢
Electrolytic iron, unannealed, minus 325 mesh, 99+% Fe. ..... 44.0¢
Hydrogen reduced iron, minus 300 mesh, 98+% Fe ... 63.0¢ to 80.0¢
Carbonyl iron, minus 300 mesh, 98%, 99.8+% Fe .... 90.0¢ to $1.75
Aluminum ..... 23.0¢
Antimony ..... 44.0¢
Brass ..... 24.0¢ to 28.5¢
Copper, electrolytic ..... 30.625¢
Copper, reduced ..... 30.5¢
Cadmium $2.40
Chromium, electrolytic, 99% min. $3.50
Lead ..... 24.0¢
Manganese ..... 50.0¢
Molybdenum, 99% $2.65
Nickel, unannealed ..... 51.5¢
Nickel, spherical, minus 30 mesh ..... 53.0¢
Silicon ..... 29.0¢
Solder powder ..... 8.5¢ plus metal cost
Stainless steel, 302 ..... 75.0¢
Tin $1.01⅜
Tungsten, 98%, 99% $2.90

COKE

Furnace, beehive (f.o.b. oven) Net Ton
Connellsville, Pa. ..... $12.00 to $13.00
Foundry, beehive (f.o.b. oven)
Connellsville, Pa. ..... 13.50 to 14.50
Foundry, Byproduct
Chicago, del'd $18.60
Chicago, f.o.b. 17.50
New England, del'd 21.75
Seaboard, Kearney, N. J., f.o.b. .. 17.85
Philadelphia, f.o.b. 17.75
Swedeland, Pa., f.o.b. 17.75
Buffalo, del'd 20.15
Ashland, Ohio, f.o.b. 15.50
Painesville, Ohio, f.o.b. 16.60
Erie, del'd 19.95
Cleveland, del'd 17.90
Cincinnati, del'd 18.55
St. Louis, del'd 18.05
Birmingham, del'd 15.70

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

Carloads, Per 1000

No. 1 Ohio $67.00
First quality, Pa., Md., Ky., Mo., Ohio 73.00
First quality, New Jersey 78.00
Sec. quality, Pa., Md., Ky., Mo., Ohio 67.00
Sec. quality, New Jersey 70.00
No. 2 Ohio 59.00
Ground fire clay, net ton, bulk 10.50

Silica Brick

Pennsylvania and Birmingham $73.00
Chicago District and Alabama 82.00
Silica cement, net ton (Eastern) .. 12.50
East Chicago 13.50

Chrome Brick

Per Net Ton

Standard chemically bonded, Balt., Plymouth Meeting, Chester $64.00

Magnesite Brick

Standard, Balt. and Chester $86.00
Chemically bonded, Baltimore 75.00

Grain Magnesite

std. ⅝-in. grains

Domestic, f.o.b. Balt. and Chester in bulk, fines removed $51.50
Domestic, f.o.b. Chewelah, Wash., in bulk with fines 27.00
in sacks with fines 31.84

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk. Midwest, add 10¢; Missouri Valley, add 20¢. $11.00

WAREHOUSE PRICES

Base prices, delivered metropolitan areas, per 100 lb.

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Philadelphia	$4.56	$5.77	$5.90	$4.82	$5.90	$4.85	$4.57	$4.87	$5.75	$8.47	$8.77	$10.30	$10.45
New York	4.76	5.76[1]	6.16	5.08	6.08	5.11	4.80	5.08	5.80	8.68	8.83	10.35	10.50
Boston	4.83	5.69	6.23[12]	5.61	6.87	5.18	4.91	5.04	5.88	8.99	9.14	10.43	10.58
Baltimore	4.32	....	5.72	4.80	....	4.77	4.71	4.85	5.71	....	....	....	....
Norfolk	4.90	....	....	5.30	....	5.15	5.15	5.20	6.00	....	....	....	....
Chicago	4.25	5.10	5.65	4.35	5.45-6.65	4.60	4.40	4.40	5.10	8.20	8.35	9.50	9.65
Milwaukee	4.458	5.308	5.858	5.058	5.658	4.808	4.608	4.608	5.395	8.645	8.795	9.945	10.095
Cleveland	4.25	5.10[1]	5.82	5.05	....	4.60†	4.70	4.40	5.10	8.61	8.76	9.50	9.65
Buffalo	4.25	5.10	6.03	5.23	5.72[5]	4.98	4.40	4.40‡	5.10	8.20	8.35	9.50	9.65
Detroit	4.41	5.26	6.07	4.77	5.67	4.9.+†	4.82	4.56-4.82	5.26	8.82	8.97	10.09	10.24
Cincinnati	4.56	5.22	5.77	4.77	....	4.98	4.82	4.78	5.63	....	....	....	....
St. Louis	4.61	5.46	6.22	4.71	6.02	4.96	4.76	4.76	5.67	8.92	9.07	10.22	10.37
Pittsburgh	4.25	5.10[1]	5.65	4.35	....	4.60	4.40	4.40	5.10	8.20	8.35	9.50	9.65
St. Paul	4.68	5.53	6.08	4.78	....	5.03	4.83	4.83	6.00	....	....	....	....
Omaha	5.262	....	6.712	5.362	....	5.612	5.412	5.412	6.112	....	....	....	....
Indianapolis	4.55	5.38	5.93	4.65	5.95	4.90	4.70	4.70	5.57	....	....	....	....
Birmingham	4.45[11]	....	5.80	4.45[11]	....	4.65[11]	4.40[11]	4.40[11]	6.13	....	....	....	....
Memphis	4.88[11]	5.94[1]	6.43	5.08[11]	....	5.23[11]	5.03[11]	5.03[11]	5.94	....	....	....	....
New Orleans	*5.05[11]	6.39[1]	....	5.25[11]	....	5.40[11]	*5.10[11]	*5.20[11]	6.39[6]	....	....	....	....
Houston	5.55	....	7.05	5.65	....	5.90	5.70	5.70	7.00	9.40	9.25	10.40	10.55
Los Angeles	5.75	7.35[1]	7.40	6.05	8.70[5]	5.55	5.35	5.50	7.35[14]	9.70[15]	9.55[10]	11.15[15]	11.30[15]
San Francisco	5.40[8]	6.65	7.05	5.75[8]	8.70	5.50	5.30	5.05	7.50	9.70[15]	9.55[15]	11.15[15]	11.30[18]
Seattle	5.45[4]	7.25[2]	7.10	5.60[4]	....	5.90	5.25[4]	5.45[4]	7.45[14]	....	8.95[16]	....	11.30[18]
Portland	5.45[4]	7.25[2]	7.10	5.85[4]	....	5.70[4]	5.40[4]	5.55[4]	7.45[14]	....	8.95[16]	....	11.30[18]
Salt Lake City	6.40	....	7.85	6.70	....	6.20	6.35	6.55	7.55	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars 1000 lb and over.

ALLOY BARS: 1000 to 1999 lb.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and over; (9) 500 to 1999 lb; (10) 500 to 999 lb; (11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over; (17) up to 1999 lb.

* Add 46¢ for sizes not rolled in Birmingham

† Up to ¾ in. thick and 90 in. wide.

‡ Add 38¢ for sizes not rolled at Buffalo.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums. Delivered prices do not include 3 pct tax on freight.

BASING POINT* PRICES						DELIVERED PRICES† (BASE GRADES)							
Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.	Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	40.00	40.50	41.00	41.50	....	Boston	Everett	$0.50 Arb.	..	46.50	46.00	.....	.....
Birmingham	35.88	36.38-39.38	.....	.....	.....	Boston	Steelton	6.27	46.27	....	.....	.....	52.27
Buffalo	40.00-42.38*	40.00-42.88*	40.50-43.38*	.....	.....	Brooklyn	Bethlehem	3.90	43.90	..	.....	.....	.....
Chicago	38.50	39.00	39.50	40.00	.....	Cincinnati	Birmingham	6.09	41.97	42.47-45.47	.....	.....	.....
Cleveland	38.50-39.75*	39.00-40.25*	39.50-40.75*	.....	.....	Jersey City	Bethlehem	2.39	42.39	42.89	43.39	43.89	.....
Duluth	39.00	39.50	40.00	40.50	.....	Los Angeles	Provo	6.93	45.93	44.43	.....	.....	.....
Erie	38.50	39.00	39.50	40.00	.....	Mansfield	Cleveland-Toledo	3.03	41.53-42.78*	42.03-43.28*	42.53-43.78*	.....	.....
Everett		45.00	45.50	.....	.....	Philadelphia	Bethlehem	2.39	42.39	42.89	43.39	43.89	.....
Granite City	39.50	40.00	40.50	.....	.....	Philadelphia	Swedeland	1.31	46.31	46.81	47.31	47.81	.....
Neville Island	39.00	39.50	39.50	40.00	.....	Philadelphia	Steelton	2.81	42.81	....	.....	.....	48.81
Provo	39.00	39.50	....	.....	.....	San Francisco	Provo	6.93	45.93	46.43	.....	.....	.....
Sharpsville	39.00	39.50	39.50	40.00	.....	Seattle	Provo	6.93	45.93	46.43	.....	.....	.....
Steelton	40.00	....	....	.....	46.00	St. Louis	Granite City	0.75 Arb.	40.25	40.75	41.25	.....	.....
Struthers, Ohio	39.50	....	....	.....	.....								
Swedeland	45.00	45.50	46.00	46.50	.....								
Toledo	38.50	39.00	39.50	40.00	.....								
Troy, N. Y.				.....	46.00								
Youngstown	39.00	39.50	39.50	40.00	.....								

* Republic Steel Corp. price. Basis: pig iron at Cleveland and Buffalo set by average price of No. 1 hvy. melt. steel scrap at Cleveland or Buffalo respectively as shown in last week's issue of THE IRON AGE. Price is effective until next Sunday midnight.

Basing point prices are subject to switching charges; silicon differential (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$49.50; f.o.b. Buffalo—$50.75. Add $1.25 per ton for each additional 0.50 pct Si, up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorus $55.00 per gross ton, f.o.b. Lyle, Tenn. Delivered Chicago, $62.55. High phosphorus charcoal pig iron is not being produced.

Ferromanganese

78-82% Mn, Maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockwood, Tenn.

Carload lots (bulk)	$145
Less ton lots (packed)	189.00
Delivered Pittsburgh	151.00

$1.80 for each 1% above 82% Mn; penalty, $1.80 for each 1% below 78%.

Briquets—Cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	8.70	8.95	9.50
Ton lots	10.30	10.90	12.80
Less ton lots	11.20	11.80	13.70

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$51.00	$52.00
F.o.b. Pittsburg.h.	50.00	51.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	32
L.c.l. lots	34

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32
Ton lots	34
Less ton lots	36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.07% max. C. 0.06% P, 90% Mn.	23.00	24.85	26.05
0.10% max. C.	22.50	24.35	25.55
0.15% max. C.	22.00	23.85	25.05
0.30% max. C.	21.50	23.35	24.55
0.50% max. C.	21.00	22.85	24.05
0.75% max. C., 7.00% max. Si.	18.00	19.85	21.05

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload bulk	7.80
Ton lots	9.45
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet	8.75
Ton lots	10.35
Less ton lots	11.25

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, openhearth $78.00, foundry, $79.00; $78.75 f.o.b. Niagara Falls; $77.50 f.o.b. Jackson, Ohio. Electric furnace silvery iron is not being produced at Jackson. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for each 0.50 pct Mn over 1 pct.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe.	16.90	17.50	18.10
97% Si, 1% Fe.	17.30	17.90	18.50

Silicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si, 1 lb Si briquets.

	Eastern	Central	Western
Carload, bulk	5.25	5.50	5.70
Ton lots	6.85	7.45	7.75
Less ton lots	7.75	8.35	8.65

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
25% Si	15.50	....	....
50% Si	9.30	9.80	10.00
75% Si	11.80	12.10	12.85
85% Si	13.30	13.60	14.35
90% Si	15.00	15.30	16.00

Ferrochrome (65-72% Cr, 2% max. Si)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	26.50	26.90	27.00
0.10% C	26.00	26.40	26.50
0.15% C	25.50	25.90	26.00
0.20% C	25.25	25.65	25.75
0.50% C	25.00	25.40	25.50
1.00% C	24.50	24.90	24.75
2.00% C	24.25	24.65	24.75
65-69% Cr, 4-9% C	18.60	19.00	19.15
62-66% Cr. 4-6% C. 6-9% Si.	19.45	19.85	20.00

Briquets — Contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	12.50	12.75	12.85
Ton lots	14.00	14.90	15.50
Less ton lots	14.90	15.80	16.40

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	19.70	20.10	20.25
Ton lots	21.85	23.15	23.95
Less ton lots	23.35	24.65	25.45

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% mn, 1.25% max. C.

	Eastern	Central	Western
Carload	25.00	25.40	25.50
Ton lots	27.30	27.95	29.15
Less ton lots	29.10	29.75	30.95

Chromium Metal

Contract prices, cents per lb, chromium contained carload packed, f.o.b. shipping point freight allowed, 97% min. Cr. 1% max. Fe.

	Eastern	Central	Western
0.20% max. C.	97.00	98.50	99.75
0.50% max. C.	93.00	94.50	95.75
9.00% min. C.	91.50	93.00	94.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	16.25	16.75	18.80
Ton lots	19.35	20.10	22.25
Less ton lots	20.85	21.60	23.75

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	17.50	18.00	20.05
Ton lots	19.80	20.65	22.40
Less ton lots	20.80	21.65	23.40

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone; 3.5¢ for western zone.

	Cast Turnings	Distilled
Ton lots	$1.85	$2.70 $3.40
Less ton lots	2.20	3.05 4.20

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-500% C.

	Eastern	Central	Western
Ton lots	18.00	19.10	21.05
Less ton lots	19.25	20.35	22.30

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn. 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

	Eastern	Central	Western
Ton lots	15.75	16.85	18.80
Less ton lots	17.00	18.10	20.05

Other Ferroalloys

Ferrotungsten, standard, lump or ¼ x down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained W, 5 ton lots, freight allowed	$2.1
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.	
Openhearth	$2.9
Crucible	3.0
High speed steel (Primos)	3.1
Vanadium pentoxide, 88-92% V_2O_5 contract basis, per pound contained V_2O_5	$1.2
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb	
Ton lots	$2.5
Less ton lots	$2.5
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo.	95
Calcium molybdate, 40-45%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo.	80
Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo.	80
Molybdenum oxide in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo.	80
Ferrotitanium, 40-45%, 0.10% C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti	$1.2
Ferrotitanium, 20-25%, 0.10% C max., ton lots, per pound contained Ti	$1.3
Less ton lots	$1.4
High carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton	$152.5
Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. Siglo, Mt. Pleasant, Tenn., $3 unitage, per gross ton	$65.0
Less ton lots	$1.2
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Carload lots	18.4
Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy	
Carload, bulk	6.0
Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.	
Carload	7.5
Ton lots	7.7
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Car lots	9.5
Ton lots	10.2

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed

Ferroboron, 17.50% min. B, 1.50% max Si, 0.50% max. Al, 0.50% max. C.

Eastern	Central	Western
$1.20	$1.23	$1.31

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

Ton lots	$1.89	$1.903 $1.936
Less ton lots	2.01	2.023 2.044

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots	$1.80	$1.8125 $1.8443

Silcaz, contract basis, f.o.b. plant freight allowed, per pound.

Carload lots	39.0
Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.	
No. 1	93
No. 6	63
No. 79	45
Bortram, f.o.b. Niagara Falls	
Ton lots, per pound	45
Less ton lots, per pound	50
Carbortam, f.o.b., Suspension Bridge, N. Y., freight allowed, Ti 15-17%, B 0.90-1.15%, Si 2.5-3.0%, Al 1.0-2.0%.	
Ton lots, per pound	8.0
Borosil, f.o.b. Philo, Ohio, freight allowed, B 3%-4%, Si 40%-45%, per lb contained B	$6.2

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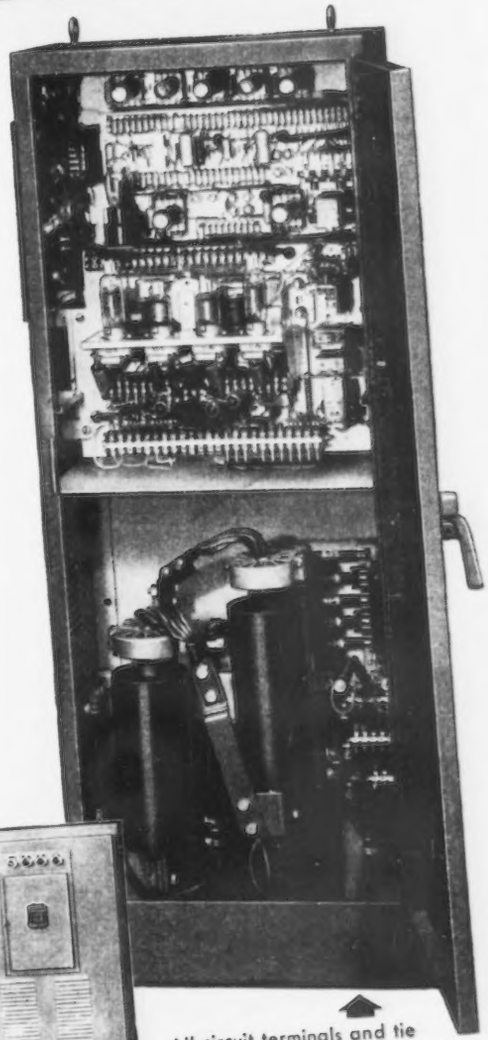
ALL FOUR CONTROL ELEMENTS IN ONE ENCLOSURE

- Electronic contactor to carry welder transformer primary current.
- Heat control to adjust welding current from 20% to 100%.
- Synchronous-precision weld timer to control duration of current flow.
- Sequence timer for control of electrode motion.

IMPORTANT NEW CONSTRUCTION FEATURES

- All terminals and circuit tie points completely accessible.
- Each element an interchangeable subpanel.
- Side of machine or wall mounting.
- Screwdriver and pliers only tools required for maintenance.



All circuit terminals and tie points accessible by opening main door and swinging out sequence panel.

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- Separate excitation of ignitors makes firing independent of load voltage or current.
- Differential discharge timing eliminates voltage errors.
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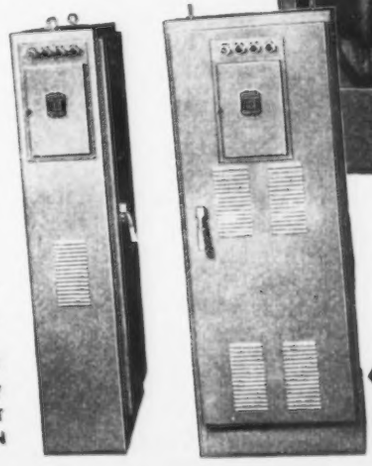

Class 8993 controller can be arranged either for side of machine mounting or wall mounting.

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(Continued from page 94)

must clear a solid pin insert, unless reaming is done to finish the hole to exact size, sufficient tolerance must be provided on the diameter to include surface roughness of the cast surface. This roughness sometimes causes the hole to seem undersize as cast. Holes intended for fluid passages need not be held to close tolerances. Blind holes are difficult to hold in higher melting alloys. In all cases it is difficult to cast blind holes for depths greater than twice the diameter. In planning to cast holes which will be tapped it is best to provide for a reaming finish before threading. This not only helps obtain better threads but reduces wear on the tap.

Minimum practical wall thickness is the same for all alloys. For large section areas 0.050 in. is commonly cast. On tapered walls some sections can be held to 0.030 in. The light metals alloys are frequently cast with extensive wall areas as thin as 0.030 in. without taper.

Edges can be case to 0.012 in. to 0.015 in. on sections such as the airfoil contours of turbine blades. Thinner edges are not worth considering, particularly in hard alloys, due to a tendency to crack in service. Thin edges are difficult to produce in wax without distortion and handling losses are high.

Threads and serations can be cast with radii of 0.005 in. The tendency for globules of metal to appear in the roots of sharp threads deters selection of cast threads except when the shape of the thread is unusually difficult to machine or the metal is too hard to tap. Externally cast threads usually have parting lines. Separately formed cores can be used to avoid these lines, but the cost is high. Internally cast threads do not have parting lines because the threaded core used to produce them chases the wax when it is rotated for removal. Internal threads are expensive due to the slowness with which cores can be withdrawn. Threads longer than ½ in. must have shrinkage compensation included in the pitch of master or die. At best, even when the thread is chased, no better than a Class 1 thread can be cast.

Large flat areas are difficult to cast free from imperfections in high melting point alloys. The designer should specify which faces must be free from all defects and which can have minor marks. For castings such as turbine blades absolute freedom from pits is essential. In most industrial applications, however, it is a matter of esthetics rather than service. The cost of the part is reflected in the degree of liberality towards minor imperfections which is permitted.

Avoid joining heavy to light sections. Use webbed designs whenever possible. An investment casting is particularly difficult to cast with total freedom from shrinkage in heavy sections due to the inability to incorporate chills and adequate risers in the molds. In converting machined part designs to investment castings all sections should be reconsidered to determine how they may be equalized and lightened. Stronger castings will result from care in this planning.

The investment process tends to be more limited than sand in forming complex cored passages. This is due to the difficulty of designing collapsible cores to be removed from the waxes without distorting them. Preformed cores of soluble materials are sometimes used and dissolved from the wax before the mold is invested. It is often best to design the waxing dies so that the cored passages are open by making separate waxes of different portions of the part and then joining the pieces by wax "welding" before investment. The radar part (fig. 2, in the first part of this article) illustrates how effective this method sometimes can be. The part shown formerly cost over $350 to machine from stock and subassemblies. The investment casting, finished, costs only $75, of which $27.50 is the casting price. By wax welding multiple assemblies can be combined into single units of high strength and low weight.

Draft is not always required. One major producer relies upon the contraction of the waxes in chilled dies to free them for removal. However most firms prefer at least ½° per side to minimize the difficulty of removing the waxes. It should be allowed whenever it is not a source of functional deficiency. The designer should indicate the faces which can be drafted and those which can not be.

Parting lines are not required to remove castings from the investment but they do arise in the need to remove wax from the die. The designer should indicate those faces which may include the parting line. The necessity of admitting metal to the cavity requires a gate. This gate should be located on a face which will be machined and preferably on a face which is parted. Usually the gate which is added on the parting line can be incorporated in the die and serves to admit the wax to the die as well as the metal to the cavity. The manner in which the wax fills the die from such a gate is a good indication of its efficiency. Removal of the gate by grinding does not permit closer tolerance than 0.010 in. in the area of the gate stub.

The problems which will appear in the casting appear first in the wax model or plastic. Heavy sections are difficult to mold in wax and shrink just as they will in the metal stage. Warpage of waxes due to improper location of light and heavy sections is not only a source of dimensional error but is also indicative of the improper basic design being cast.

Each part is a problem to the investment foundry. The five or six years of industrial experience has shown that all major design changes introduce new variables. It is therefore not possible to lay down definite production rules. To re-emphasize the complexity of the production control problem in investment forming, 20 of the major variables can be summarized as follows: (1) Master pattern accuracy; (2) original die accuracy; (3) permanence of die accuracy; (4) die temperature during waxing; (5) wax injection temperature; (6) wax temperature in the investment prior to solidification of the mold; (7) temperature of the liquid investment; (8)

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rate of heating during dewaxing; (9) investment composition; (10) wax composition; (11) location of gates and vents; (12) mold temperature during pour; (13) metal composition; (14) metal temperature at pour; (15) rate of pour; (16) presence and degree of pressure on metal; (17) speed of centrifuge; (18) solidification time prior to de-investing; (19) finishing operations required; (20) inspection standards to be met. Other variables also affect final results, but the foregoing suffice to show how complex the engineering of a new casting is at the foundry level. The designer should recognize that these engineering aspects of investment production cannot be solved over night.

Another highly oversold idea about the process has been the rapidity with which castings could be produced from the blueprint. True enough, simple castings can be made in a matter of days, providing tolerances and metal solidity are not stringent. For complex parts in almost any material, where close dimensions are specified, time alone will permit correct development. Therefore on new designs not less than six weeks can be expected between the blue print stage and the correct sample casting, in the best of circumstances. Several months should be allowed when planning a new production item.

The future for investment founding is unlimited. It provides new approaches to material design engineering which are not bound by the restrictions of conventional metallurgical practices and machining techniques. If the thought that the process is primarily used to obtain exceptional accuracy can be minimized and the realization that it is a new foundry method for casting shapes impractical to form otherwise can be attained, the correct interpretation and application of the process will result.

Unusual economies usually result from use of the process. It is not a competitive method for making parts which can be readily machined or suitably cast in other ways. Due to the number of hand operations performed, from 38 to 50, the minimum piece price is rarely less than 20¢. Obviously this is out of the screw machine range. The correct approach to investment forming is to begin with a new blueprint. This is, incidentally, also valuable for solving design problems which were created before the process was available.

Investment castings can be used profitably in nearly all complex machines. Sometimes the addition of only $1 worth of special alloys in invested form in a $10,000 machine can overcome a serious design and maintenance headache. This fact has proven true in many industries, a few of which are listed in table I.

Success in using the investment casting system lies with the willingness of the designer to familiarize himself with the real advantages and limitations. Correct understanding and application will benefit not only the user but the foundry as well.

The following firms assisted in presenting this report:
Arwood Precision Casting Corp., 70 Washington St., Brooklyn.
Austenal Laboratories, Inc., 234 East 39th St., New York.
Allis-Chalmers Mfg. Co., Milwaukee.
Haynes Stellite Corp., Kokomo, Ind.
International Nickle Co., Bayonne, N. J.
Michigan Steel Casting Co., Detroit.

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New Portable Hardness Tester

A NEW hardness tester developed by the Poldi Steel Works, Czechoslovakia, is based on the Vickers principle, and is characterized by its simplicity without sacrificing any of the accuracy obtained by the Vickers instrument. Transportable and small, its weight is only about 14 lb, the load is applied through a helical spring which is very accurately calibrated and preloaded by a hand lever.

Although the measurement of forces by means of a spring has, for a long time, been considered inaccurate, recent investigations have shown that by a suitable choice of dimensions, good production and finish, and correct heat treatment of the steel, the error due to hysteresis can be reduced to 0.02 pct. Thus the total error of indication by a spring need only be about 0.2 pct, and no hardness tester has a greater accuracy than this.

The new Poldi tester, discussed in greater detail by V. Jares in the *Engineers' Digest*, December 1947, is usually adjusted for loads of 10 and 30 kg and measurement of the imprint is carried out similarly as with the original Vickers arrangement; namely by a microscope with micrometrically adjustable sliding stops, whereby the imprint is highly illuminated at a short focal length. This is the most accurate method, permitting readings with a precision of 0.001 mm to be taken. When an imprint has been made, the microscope is moved into position by a simple movement, so that there is no necessity for other adjustment to view the imprint and confusion between imprints cannot arise. Small specimens are tested on a spherical support which is removed for testing larger parts, and the instrument is positioned directly onto the object tested. This advantage is invaluable for precision testing of large areas.

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Warehouse Association Chapters Announce New Officers for Year

Cleveland

• • • **Eleven chapters** of American Steel Warehouse Association, Inc., have elected officers for the coming year, according to announcement by Walter S. Doxsey, president of the Association. They are as follows:

Intermountain Chapter:

President—Morris Rosenblatt, Structural Steel & Forge Co., Salt Lake City. Vice President—Gordon Evans, The Galigher Co., Salt Lake City. Secretary-Treasurer—Eugene Lundstrom, The Mine & Smelter Supply Co., Salt Lake City. Chapter Director—H. P. Lambrecht, The Salt Lake Hardware Co., Salt Lake City.

Kansas City Chapter.

President—K. P. Sexton, Consolidated Supply Co., Picher, Okla. Vice President—G. E. Spencer, The Faeth Co., Kansas City. Secretary-Treasurer—R. D. Sanders, Kansas City Structural Steel Co., Kansas City. Chapter Director—P. W. Patterson, Patterson Steel Co., Tulsa, Okla.

New England Chapter:

President—Verdie A. Dodds, Brown-Wales Co., Boston. Vice President—James A. Parsons, Ward Steel Co., Boston. Vice President—Charles D. Surette, Jr., United States Steel Supply Co., Boston. Secretary-Treasurer—Carroll S. Harvey, Arthur C. Harvey Co., Boston. Chapter Director—F. H. Lovejoy, Wheelock-Lovejoy & Co., Inc., Cambridge, Mass.

Northern California Chapter:

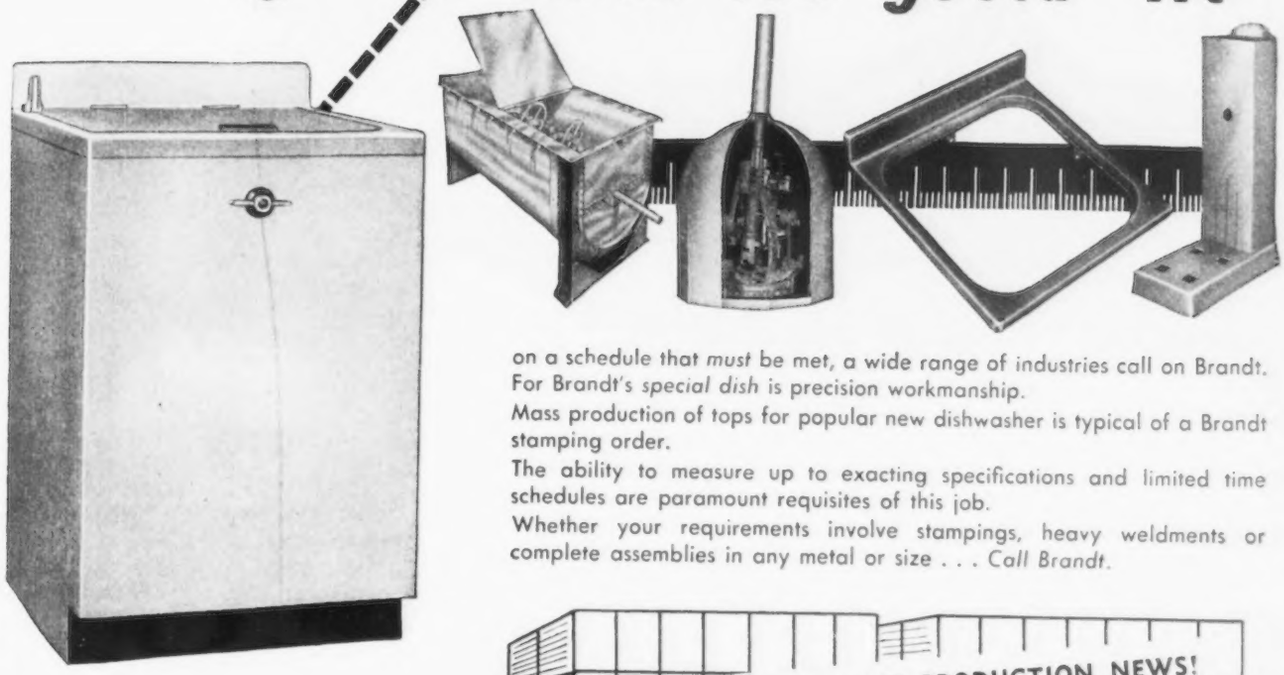
President—James D. Tayler, Tayler & Spotswood Co., San Francisco. Vice Preisdent—Paul Childs, Earle M. Jorgensen Co., Oakland, Calif. Vice President—George W. Boole, A. M. Castle & Co., San Francisco. Secretary-Treasurer—Harry Levitt, Dunham, Carrigan & Hayden Co., San Francisco. Chapter Director—James D. Tayler, Tayler & Spotswood Co., San Francisco.

Northern Ohio Chapter:

President—Edwin J. Heffner, United States Steel Supply Co., Cleveland. Vice President—Thomas H. Paterson, Paterson-Leitch Co., Cleveland. Secretary-Treasurer—George Kuhnle, The Peninsular

A HUMOROUS APPROACH TO A SERIOUS MATTER

when it's gotta' fit—



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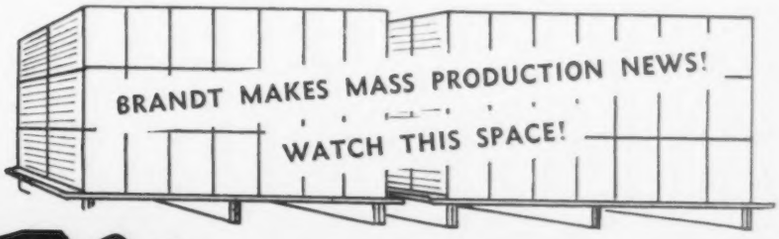

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STAMPINGS HEAVY WELDMENTS FABRICATING

NEWS OF INDUSTRY

Steel Co., Cleveland. Chapter Director—F. W. Krebs, Super Steels, Inc., Cleveland.

Pacific Northwest Chapter:

President—H. Ernstrom, J. E. Haseltine Co., Portland, Ore. Vice President—Norton Peck, Pacific Metal Co., Portland, Ore. Secretary-Treasurer—H. S. Barde, Pacific Steel Warehouse Co., Portland, Ore. Chapter Director—Harry Arntzen, Marshall-Wells Co., Portland, Ore.

Philadelphia Chapter:

President—Arthur L. Collins, Horace T. Potts Co., Philadelphia. Vice President—C. L. Hardy, Joseph T. Ryerson & Son, Inc., Philadelphia. Vice President—C. H. Stoeckle, Crucible Steel Co. of America, Philadelphia. Vice President—J. E. Muller, Potts-Farrington Co., Philadelphia. Vice President—W. H. Franklin, Edgcomb Steel Co., Philadelphia. Secretary-Treasurer—John D. Drummond, Peter A. Frasse & Co., Philadelphia. Chapter Director—J. J. Hill, Jr., Hill-Chase & Co., Inc., Philadelphia.

Pittsburgh Chapter:

President—K. P. Rindfleisch, United States Steel Supply Co., Pittsburgh. Vice President—F. B. Lorenz, Edgar T. Ward's Sons Co., Pittsburgh. Vice President—J. M. Malone, C. A. Turner, Inc., Pittsburgh. Secretary—Donald C. Lott, Fort Duquesne Steel Co., Pittsburgh. Treasurer—A. P. Levinson, Levinson Steel Sales Co., Pittsburgh. Chapter Director—H. E. Williams, Williams & Co., Inc., Pittsburgh.

Southern California Chapter:

President—Wayne Rising, Ducommun Metals & Supply Co., Los Angeles. Vice President—J. Thomas Mahl, Mahl Steel & Supply Co., Huntington Park, Calif. Vice President—T. L. Kishbaugh, Joseph T. Ryerson & Son, Inc., Los Angeles. Secretary—W. H. Lindberg, Earle M. Jorgensen Co., Los Angeles. Treasurer—G. C. Holly, Service Steel Co., Los Angeles. Chapter Director—E. Jungquist, Percival Steel & Supply Co., Los Angeles.

Texas Chapter:

President—A. S. Bennett, Alamo Iron Works, San Antonio, Texas. Vice President—R. L. Philips, Pedem Iron & Steel Co., Houston. Vice President—A. G. Nauert, Maxwell Steel Co., Fort Worth, Texas. Vice President—C. M. Finley, Moncrief-Lenoir Mfg. Co., Dallas. Vice President—Heino Staffel, San Antonio Machine & Supply Co., San An-

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In the South: ARKANSAS FUEL OIL COMPANY

tonio, Texas. Vice President—M. S. Darbyshire, Darbyshire-Harvie Iron & Machine Co., El Paso, Texas. Secretary—W. B. Hartshorn, Fort Worth Structural Steel Co., Fort Worth, Texas. Treasurer—R. E. Elam, Jr., Markle Steel Co., Houston. Chapter Director—A. S. Bennett, Alamo Iron Works, San Antonio, Texas.

Washington Chapter:

President — Jesse Schoenfeld, Schwabacher Hardware Co., Seattle, Wash. Vice President—R. W. Raport, Barde Steel Co., Seattle, Wash. Secretary-Treasurer—Grant H. Ryer, Crucible Steel Co. of America, Seattle, Wash. Chapter Director—C. C. Mueller, A. M. Castle & Co., Seattle, Wash.

Morton-Gregory Corp. Buys Assets of Nelson Stud Welding Corp.

Lorain, Ohio

• • • **Purchase of the** manufacturing assets and patent interests of the Nelson Stud Welding Corp. and its associated companies by the recently-formed Morton-Gregory Corp., Michigan, was announced by George E. Gregory of Toledo, vice president and general manager. Henry J. Morton, Detroit, is president of the new firm.

At the time of its formation a few months ago, the new company acquired the research, development and marketing business of Henry J. Morton Associates, Inc., whose products included the Morton CO-Z-AIR, an electric warm air radiator. It is also working on the development of a type of cast electric heating element for such appliances as electric irons, immersion heaters, waffle irons, coffee makers, cooking utensils, and the like. The company is also actively engaged in the development of new wiring and other electrical products.

In announcing purchase of the stud welding business, Mr. Gregory stated that all of the Nelson manufacturing and engineering activities will be centralized at the Lorain plant, which will be known as the Nelson Stud Welding Division, Morton-Gregory Corp. Nelson's present staff of field engineers and its 18 engineering offices will be continued as part of this Division.

The Morton Research Laboratories will continue operations in Detroit as a division of Morton-Gregory. Their program will include

research directed toward the wider use of stud welding.

Horace S. Maynard, Detroit, associated with the Fred J. Fisher Estate and secretary and director of Udylite Corp., is secretary-treasurer of Morton-Gregory Corp. Serving with Mr. Morton, Mr. Gregory and Mr. Maynard on the firm's board of directors are: Martin G. Chapin, Sr., vice president and director, The Metal Specialty Co., Cincinnati; Raymond T. Perring, vice president, The Detroit Bank; Edwin C. Lewis, senior partner, Lewis & Watkins, Detroit legal counsel; William J. Kane, formerly sales manager, industrial division, Owens-Corning Fiberglas Corp., who will also act in capacity of sales manager of consumer products for Morton-Gregory Corp.; Dr. Vernon C. Abbott, Pontiac, Mich., and William Sinclaire, an officer of Corning Glass Works.

Morton-Gregory Corp. has established executive and sales offices in Manhattan Building, Toledo.

Newport Rolling Mill Reports Net Sales Up

Detroit

• • • **Newport** Rolling Mill Div. of International Detrola Corp., Detroit, has reported net sales of $25,139,736, equal to 35 pct of the company's total business volume.

Gross sales of $71,682,180 are reported for the Steel, Refrigeration, Radio, Aircraft and Machinery Div. of the company, compared to $40,810,028 in 1946. The 1947 sales figure includes for the first time a full 12 month sales of the Steel Div.

In a letter accompanying the stockholders' report International Detrola disclosed that additions being made to International's steelmaking capacity will involve outlays of $6 million.

Ban Exemptions Continued

Washington

• • • **The revised FLC** Order 6, exempting certain items in short supply from the ban on return of foreign surplus, has been extended from April 30 to October 31, 1948. The exceptions to the general prohibition are:

Motorized road graders and crawler-type tractors with repair parts for each, carbon steel, steel containers, compressed gas cylinders, telephone and telegraph equipment, and trucks with six wheel drive, four tons and up.

Research Laboratory of Oliver Mining Co. Opened To Public

Duluth

• • • **Culminating nearly** 40 years of interest in the beneficiation of low grade iron ores, the Oliver Mining Co., U. S. Steel Corp. subsidiary, opened its new research laboratory here to the public. The first commercial concentrator plant built in the Minnesota area was erected by Oliver Mining in 1910 at Trout Lake. Since then the company has closely followed and developed pilot plant procedures, some of which have been installed to properly prepare, concentrate or beneficiate some types of ores mined in that region.

With the possibility that broad scale beneficiation of low grade ores such as taconite will probably be encountered within the next 10 or 15 years, this subsidiary is spending much more time and effort than in the past, to be ready for the day when the high grade ores run out.

The Mesabi Range has been estimated to contain 1,700,000,000 long tons of concentrates occuring in taconite ores which would be available by present magnetic concentration methods and using open pit mining to a vertical depth of 230 ft. This does not include the recovery of non-magnetic taconite which may be recovered by other processes.

According to the best estimates a ratio of more than $10 in original plant investment for every ton of concentrated ore produced yearly is the approximate cost of using the lower grade ores. At present Oliver operates five ore beneficiation plants in the Mesabi Range. In their new laboratory they are studying beneficiation processes on all the known lower grade ores that occur in the Lake Superior region.

The lab is equipped to set up small pilot plant procedures employing many different types of beneficiation and concentration equipment. A special feature of the pilot plant area and the batch testing laboratory is the flexible arrangement for setting up experimental flow sheets for concentrating ores.

The pilot plant test area extends the equivalent of 2½ floors from a well in the basement through an opening in the first floor which provides a vertical space 27 ft in height, 60 ft wide and 22 ft long

This permits installation of test equipment at various working levels and makes for great flexibility in what the lab can set up on a pilot plant testing procedure.

The laboratory is completely equipped for chemical analysis, microscopy, petrography, and specimen preparation.

Officials of the company claim that long range, intensive research is necessary if economical and practical iron ore beneficiation processes are to be developed. Methods must be worked out for adding these lower grade ores to potential reserves, to assure future self sufficiency in iron ore supply.

Essentially the problem consists of three main factors according to company officials; gangue elimination and iron recovery, development of low cost concentrating methods, and agglomeration.

Walter L. Maxson, Oliver's vice president in charge of research told the press conference up at Duluth on April 23, that one era in iron mining is gradually drawing to a close and another, "challenging all the ingenuity and knowledge that raw materials engineering can muster," is dawning. Since there are billions of tons of taconite, he said, "the perfection of an economic method of extracting iron values from it should solve the problem of American iron ore reserves for years to come."

As to the quality of future ore, Mr. Maxson indicated furnace operators should share the problems of the ore dresser. In 1944 he declared there were 158 separate grades of ores specified, many of which include overlapping duplications. He warned that the period of multiple grades of high quality ore, blended to exact specifications, is ending.

He suggested that blast furnace operators project their thinking to the time when the proportions of fine structure concentrates will arrive in agglomerated form, either nodulized or sintered.

Builds Press for Africa

Eddystone, Pa.

• • • **A 7400-ton** steam platen press, one of the largest of its type built for processing board, has been completed here by the Baldwin Locomotive Works for the Masonite Corp. of America and shipped to South Africa for assembling and installation.

Export Quotas for Second Quarter Set by OIT for Metals

Washington

• • • **Export quotas** for a group of 44 metal products have been set for the second quarter by the Office of International Trade, Commerce Dept. In addition to previously announced quotas, OIT has set quotas for the following commodities (short tons):

Surplus, offgrade, and reject steel, 30,000 [1]; refined copper, bus bars only, 50; old and scrap copper, 1,000; copper pipes and tubes, 4,000; copper plates, sheets, and strips, 2,500; copper rods, 1,000 [2]; copper wire, bare, 3,000 [2 3]; rubber-covered wire, except lamp cord, 3,000 [2]; weatherproof wire, 1,000 [2]; other insulated copper wire, 5,500 [2]; brass and bronze, scrap and old, 7,500 [4]; brass and bronze ingots, 5,000 [4]; brass and bronze bars, rods, and unfinished shafting, 5,000; brass and bronze blanks, plates, sheets, and strips; bronze circles, 5,000; brass and bronze pipes or tubes (include pipe coils), 5,000; brass and bronze pipe fittings, 500; brass and bronze wire, bare and insulated, 3,000; bronze structural shapes, brass and bronze castings and forgings, 400; lead pigs and bars (include blocks and ingots), 500 [5]; lead sheets and pipes (include bends), 500 [5]; lead solder, 150 [5 6]; type metal (antimonia lead), 1,000 [5]; lead anodes, 100 [5]; lead foil and lead-tin foil, 50 [5]; lead plate or battery plate, not assembled as complete battery units, 3,000 [5]; lead scrap and residues, 1,000 [5]; lead castings, 200 [5]; tin tubes, 4 [7]; tin metal, in ingots, pigs, blocks, slabs and other forms, 15; zinc cast in slabs, pigs, or blocks, 5,000 [8]; babbit metal, 300 [9]; antimony (include metals or regulus, needle or liquated antimony, alloys, and antimony-bearing scrap metal), 100; cadmium metals (include metallic shapes), 200; copper alloys in primary forms except brass, bronze, nickel or gold, 500; type (include multigraph type), 200.

NOTE:

[1] *A second quarter 1948 quota of 30,000 tons has been established for surplus steel, irrespective of Schedule B classification, provided that no individual quota may be increased by more than 15 pct, and not more than 25 pct of the 30,000 tons may be licensed in any one category.*

[2] *Copper rods, and copper wire of foreign origin will be licensed without restriction.*

[3] *Not more than 250 tons shall consist of copperweld wire.*

[4] Tin content not to exceed 5 pct.
[5] Lead manufactures produced from bonded imports of lead or lead ore will be licensed without restriction.
[6] Tin content not to exceed 60 short tons.
[7] Licenses will be issued against this quota only for tin tubes to be used for certain medicinal and pharmaceutical purposes in accordance with Order M-43, Schedule 1, paragraph 2, listings 1 and 2.
[8] Zinc in slabs, pigs, or blocks "in bond or produced from zinc in bond" will be licensed without restriction.
[9] Tin content not to exceed 108 short tons.

Monsanto and AEC Present Atom Show In Miami Valley

Miamisburg, Ohio

• • • **The "Miami Valley** Atomic Energy Show", the first of its kind staged anywhere, was held here April 29, 30 and May 1, sponsored by Monsanto Chemical Co. and the U. S. Atomic Energy Commission. More than 30 exhibits and six "live" stage demonstration devices have been built by Monsanto scientists and craftsmen at the atomic energy facility operated by the company in Dayton. Divided into two main parts, the fixed or static part of the show was held in the Miamisburg High School gymnasium, which was converted into a museum for the occasion.

The second section of the show—the "live" or dynamic section—was held on the stage of the Miamisburg Auditorium where lecturer-demonstrator teams engaged in a 70 minute demonstration of atomic energy. Much of the "live" show was produced in an atmosphere of "black light" with the auditorium in total darkness through the use of specially prepared fluorescent devices and materials. A unique "ping-pong pile," a machine six ft sq which contains more than 126 electrical switches, more than 2900 other parts, and uses 150 ping-pong balls, demonstrated chain reaction.

Another device, requiring ultra-violet light, showed construction and actual action of an atom and its component parts. An unusual radiation detector, using both audible and visual, colored light effects, was also built. Fission was illustrated through the use of a large "newtron gun," again with effects audible and visible to the audience. In the gymnasium one of the fixed exhibits will permit spectators to compare normal finger tip heat with that generated by an adjacent radioactive sample. A model concept of a "power pile" and a typical coal

furnace showed comparative production and use of energy by these two sources. Exhibits of the show will be manned by Monsanto scientists and technicians who are using the equipment. More than 20 scientists will be available in the gymnasium in groups of 12, for explanation of the various exhibits.

Kenneth A. Dunbar, Dayton area manager of the AEC, has cited the show as an outstanding example of the national educational iams of the Commission. It is in complete agreement with the Commission's firm hope that this complex subject may be clearly understood and appreciated by the people—all of the people—of the nation which had so much to do with its conception and development.

Canadian Production Good, Though Demand Still Above Supply

Toronto

• • • **While prospects** are favorable that iron and steel production in Canada this year will equal or slightly exceed that of 1947, there are no indications that the general supply situation will show any easing before 1949. The coal strike situation in the United States which may lop a few hundred thousands of tons off American production, and the proposed new defense program calling for large tonnages of steel together with the normal shortage across the line, are causing some uneasiness on this side of the border.

While Canadian government restrictions on steel imports from the States have not been too serious up to this time, United States internal affairs may react toward the cutting of exports to this country. Reduction in American steel imports would have serious effect on Canadian industrial activities and undoubtedly would result in sharp curtailment of operations of plants whose principal raw materials are iron and steel.

At present Canadian steel producers are operating at virtual capacity, but even at this high rate they can supply less than two-thirds of total domestic requirements . . .

Heads of leading Canadian steel companies are proceeding with plans which will substantially increase production of both iron and steel, but it will take a year or two

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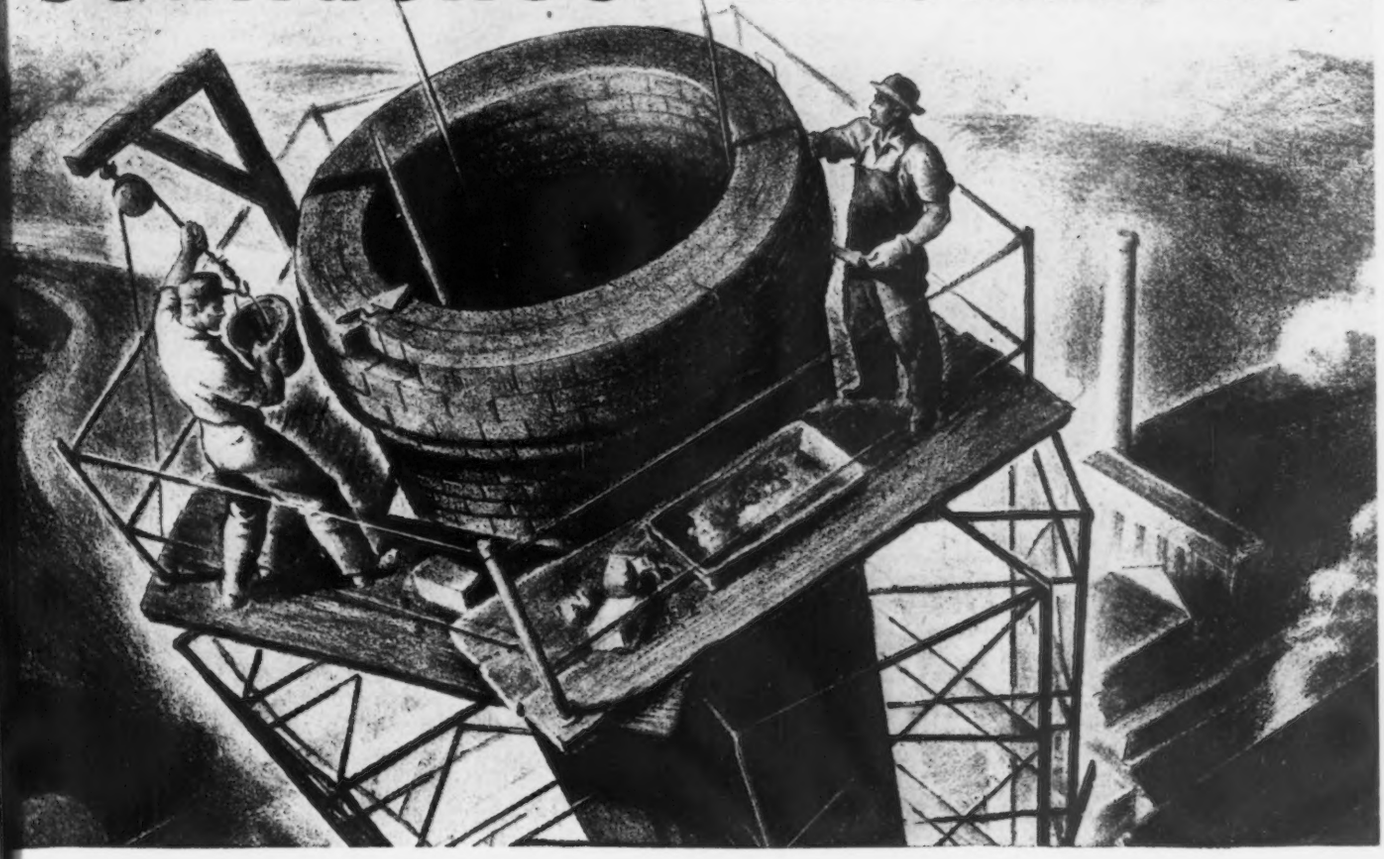

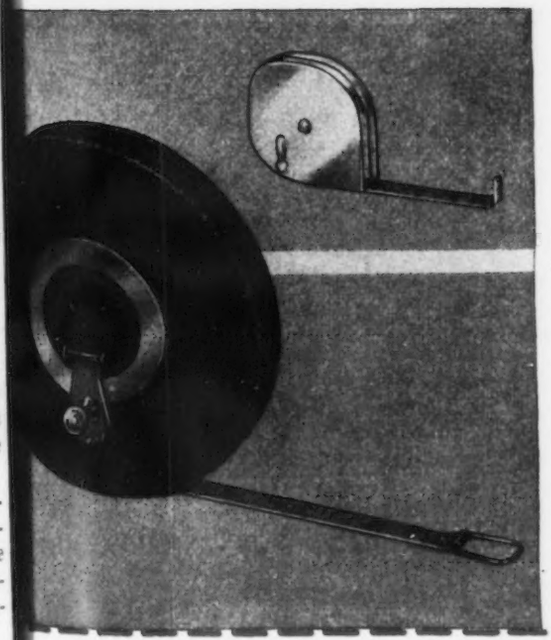

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before new installations can be completed, even if started without further delay. Under the proposed enlargement program both the Steel Co. of Canada Ltd., and Dominion Foundries & Steel Ltd., Hamilton, Ont., are considering new blast furnace installations as well as new steel rolling units, etc., involving an expenditure in excess of $30,000,000.

When these proposed new installations are completed, and business in general returns to a more normal basis, Canadian iron and steel production capacity will be about equal to domestic requirements. However, it is not expected that Canadian producers will go into all types of steel production as there are some items, with comparatively limited demand in this country, which are not considered warranted when high costs for equipment installations are taken into consideration.

Canadian steel makers now are pushing production to the limit of their raw material supply, and in practically all instances mills are booked solid to the end of June. At present new order placing is somewhat restricted due to the fact that mills have no surplus capacity for second quarter and are not accepting third quarter commitments.

Steel plate and sheets are creating the most serious problems and production is far below demands and mills are holding deliveries to a monthly quota basis. Carbon bars are still short of meeting all requirements but there have been indications of some easing recently.

Structural steel shapes are decidedly tight and any curtailment in imports would be reflected in further sharp cut in construction work in Canada. Nails also are a problem and it is difficult for the man-on-the-street to obtain supplies for small jobs without going through the black market, while big consumers also report difficulty in getting nails.

Practically all lines of carbon steels are in short supply. Stainless steel, alloy steel and cold drawn steel items are in fair supply with no shortages reported.

Armco Pioneer Honored

Middletown, Ohio

• • • **A bronze statue** of the late George M. Verity, founder of Armco, was unveiled here April 22.

The 7-ft likeness of Mr. Verity, a pioneer in the steel industry, will be permanently placed on the ter-

races of the company's general offices during the fifth observance of Armco's Founder's Day. Armco's board of directors commissioned the well known Cincinnati sculptor Ernest Bruce Haswell to create the statute. Not including its granite base, the figure weighs nearly 600 lb.

U. S. Steel's New Lab Stresses Flexibility For Taconite Study

Duluth

• • • **Flexibility of** operations is the keynote of the new iron ore research laboratory established here by Oliver Iron Mining Co. This latest addition to research facilities of the U. S. Steel Corp. will extend still further the studies of iron ore beneficiation processes sponsored by Oliver for the past 55 years. Among other activities, the new laboratory will study development of commercially practical processes for concentrating taconite—a compact, siliceous rock that must be ground to fine particle sizes before its iron oxide content can be effectively separated from the silica and minor gangue materials.

Because of the wide range of ore types to be studied, the laboratory is laid out to permit rapid change-over from one type of ore processing flow sheet to another. Relatively little equipment in the testing areas is fixed. Most of it is brought to the test areas when needed and when no longer needed removed to a storage area on the top floor of the laboratory building.

Two areas in the new laboratory have been reserved for setting up experimental ore concentrating lines, or flow sheets. One is the batch laboratory, where individual phases of ore concentrating problems are studied, while the other is the pilot plant area.

Vertical steel columns surround the test areas. Each carries a series of equally-spaced brackets that serve as supports for steel beams and cross members at any desired level. Floors are provided at the various levels by laying steel subway grating on the beams and cross members. The units making up a particular flow sheet are then installed at the proper floor levels.

In the batch laboratory, tests of 1 to 1000 lbs of representative material are conducted in bench-mounted units.

Predicts Production of Zinc Will Shift to Western States

St. Louis

• • • **A prediction** that 1948 would see a further shift in the production of zinc to the Western States, bringing that area to an estimated 59.4 pct of total domestic production, with 25.9 pct from the Eastern States and only 14.7 pct from the Central States, was made at the American Zinc Institute meeting here by R. J. Mechin of St. Joseph Lead Co.

The increasing zinc productivity of the Western States was shown to be a long term trend according to statistics reported at the meeting.

Important new projects for the production of zinc are restricted to mines now operating, according to Mr. Mechin. The outstanding project looking toward future production from what may well be termed a new locality, was the activity in the original zinc-producing district of the United States by the country's oldest zinc company at Friedensville, Pa. where the New Jersey Zinc Co. is developing the property for production in 1951. General plans of the project were completed early in 1947, and detailed engineering and design followed immediately. The work preliminary to shaft sinking was completed during the year. It consisted principally of grouting the shaft location to a depth of several hundred feet, at which point competent rock formations were encountered.

Domestic Zinc Production by Area

	Estimated 1948 Tons	Pct of Total
Eastern	161,000	25.9
Central	91,000	14.7
Western	369,000	59.4
Total	621,000	
	1947 Tons	**Pct of Total**
Eastern	158,810	25.4
Central	132,000	21.1
Western	334,198	53.5
Total	625,019	
	1940-1946 7-Yr. Av. Tons	**Pct of Total**
Eastern	177,179	25.7
Central	220,572	31.9
Western	292,856	42.4
Total	690,607	

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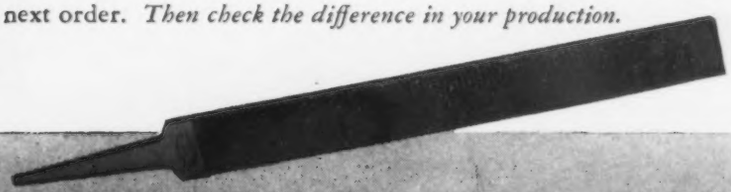
Here's top value for your file-dollar. Simonds makes "Red Tangs" in top grade *only* . . . and that's the only grade of work you get from them. Tell your Distributor you want "Red Tangs" on your next order. *Then check the difference in your production.*



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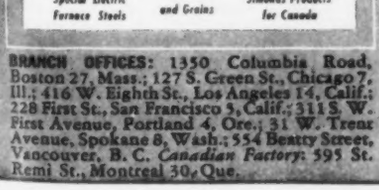

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When you use Simonds you stay in the Highlands . . . of *consistent* cutting efficiency"

NEWS OF INDUSTRY

Many-Purpose Power Tool

Detroit

• • • **Production of new,** many-purpose power tool under the registered name of "Multi-Tool" has been announced by Continental Motors Corp., Detroit. The new portable tool offers speeds from 1600 to 2600 rpm. A built-in speed control unit maintains speed regardless of load. The new unit weighs about 50 lb.

According to Continental engineers, the Multi-Tool will bore holes in wood or metal, at speeds required by wood augers or develop high speeds suited to small twist drills. The new device will sand, grind, scratch, buff or polish. It will operate clippers or shears and can be readily moved for on-the-spot drilling, grinding or filing. It can also be used to drive cement mixers, pumps, corn shellers, food grinders and mixers, conveyors, sprayers, compressors and drill presses, lathes and saws.

Willys-Overland Net

Toledo

• • • **During the first** 6 months of its fiscal year, Willys-Overland Motors showed a net profit of $3,197,935 equivalent to $1.06 per common share on a half yearly basis. This compares with a net profit of $1,164,886 for the same period a year ago.

Gross sales for the 6-month period aggregated $90,367,747. During this period, the company produced 72,040 jeeps, trucks, station wagons and sedans.

According to James D. Mooney, president, Willys-Overland expects to have 6000 more productive workers in its plant during the last 6 months of this year, provided steel and other supplies are available.

Urges Scrap Clean-Up

Boston

• • • **Walter H. Wheeler Jr.,** chairman of the industrial committee of New England Council, has appealed to New England manufacturers to clean up on scrap metal. He says:

"New England foundries are running short of scrap iron, casting deliveries are being delayed, and production in our metal working plants is being stymied.

"We urge you to delegate personnel to look in all nooks and corners of your plant, under benches and whatever scrap gets thrown or hidden and start it moving toward buyers."

Formal Opening for B & O's New Dock Highlights Progress

Lorain, Ohio

• • • **Formal opening** ceremonies for the B & O's new $4,500,000 coal dock here April 28 drew many coal and rail industrial leaders to this Great Lakes port.

The new coal dock adjoins the older B & O ore dock at the mouth of Black River. The complete facility now includes two piers, a rail yard with a capacity of 4000 cars, the coal-dumping machine and three ore unloading machines.

The two piers of the dock are 1100 ft long and lie within the protection of the breakwater. Between them is a slip with a 22-ft depth, capable of accommodating the largest coal vessels.

The dumper pan is designed to wash the coal and spray it with a chemical solution while it is being handled, and the chute is equipped with a trimmer that loads the coal evenly and quickly in the holds of the ships. The machinery is designed to return the empty coal cars automatically to the yard. Electric switches and car-retarders to control the movement of these empty cars are under the remote control of a tower operator.

Two-way voice radio assures efficiency of communication between the supervisor of the coal dumper, the tower operator and the operators in the electric pushers that move the cars up to the dumper ramp.

Safe operation is guaranteed through a system of electrical and mechanical interlocks on all of the machinery, so that no movements can be carried out unless the machinery is clear and in proper position.

Reports Net Sales

Monroe, Mich.

• • • **Net Sales of** the Monroe Auto Equipment Co. reached $9,426,949 for the first 9 months of the fiscal year ending June 30, 1948, it was reported recently by B. D. Macintyre, president, in the company's quarterly report to stockholders.

Net income for the same period was $417,670 after provision for $281,270 in federal income taxes, and is equal to 91.5 cents a share on the common stock after payment of preferred stock dividends.

Charges Patent Office Red Tape Is Causing Industrial Hardships

Chicago.

• • • **In an open letter** to the Commissioner of Patents, Dr. Johan Bjorksten, president of Bjorksten Research Laboratories, Chicago, declared that the number of patents issued in 1947 is the smallest since 1888, largely due to the fact that the patent office now allows effective patents only to inventors who make an exceedingly detailed disclosure. Secret practice of inventions has become more prevalent in preference to patenting as the required disclosures entail so much work in chemical cases that few can afford the necessary work. A few years ago adequate protection could have been based on a short time of laboratory work within reach of the inventor or small firm.

Because of these new requirements inventors and firms are increasingly compelled to abandon their patent applications in favor of secret practices, or keep their applications pending as long as possible so they may decide whether the large expenditures for detailed experiments will be warranted. Dr. Bjorksten stated, "If these excessively detailed disclosures are continued to be required, forcing the abandonment of costly applications and the practice of trade secrets, it will cause irreparable harm by depriving the public of valuable inventions."

Construction Activity In March Hit Billion; 30 Pct More Than 1947

Washington

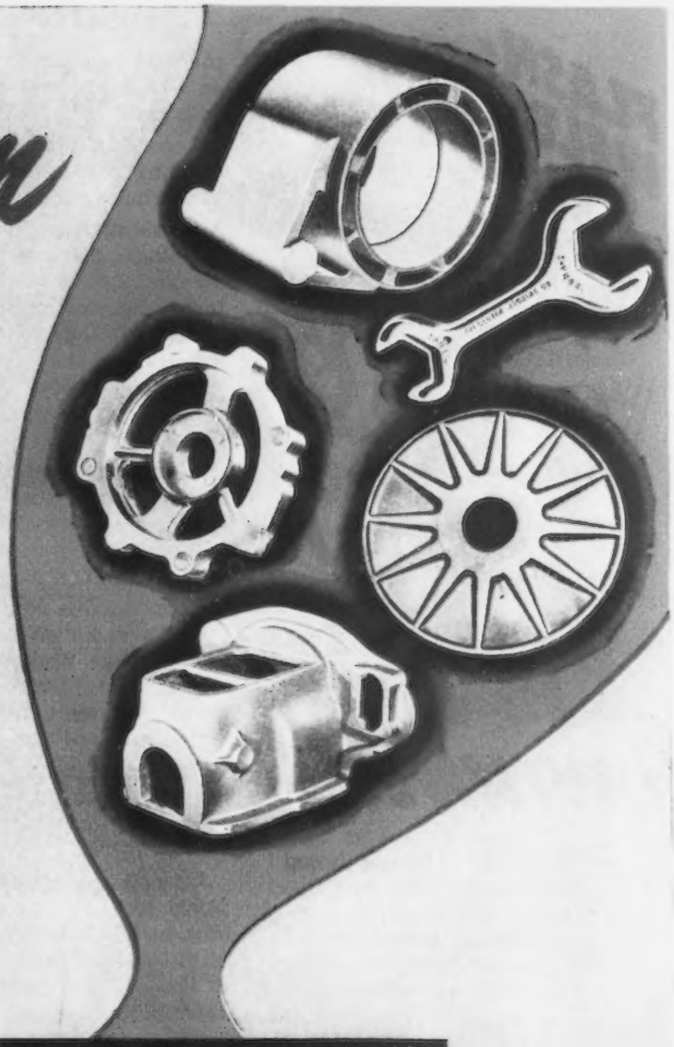
• • • **Preliminary figures** by the Federal Works Administration place March construction activity at $1.1 billion to bring the 1948 first quarter total to above $3 billion. This is approximately 30 pct more than for the same period 1947.

Despite increased building activity which will require 7 million tons of steel this year, FWA believes that procurement problems will be less than for last year and shortages less noticeable as the year goes ahead. Shortages of steel and its products, FWA forecasts, will be largely local rather than general.

In the meantime, construction materials output for February decreased as a whole although some

Aluminum

YOUR ANSWER TO CAST IRON SHORTAGES



If you're having trouble with 1948 ferrous casting deliveries, consider the remarkable advantages of aluminum. Delivery is fast, ultimate cost is low, and *now*, with two remarkable new alloys, Acme offers you the *highest combination of tensile strength, impact resistance, and elongation available today in aluminum castings.*

Now you can change from cast and malleable iron to aluminum with no sacrifice in strength.

Acme has the facilities, the technicians and the know how to aid you in your 1948 requirements—from blueprint to finished product.

Specify any aluminum, brass, or bronze alloy or consult our engineers.

Send Blueprints—Prompt Estimates

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PERMANENT MOLD

NOW Super Hi-Strength ALUMINUM CASTINGS

Acme Almag 55

The highest combination of strength, ductility, and impact resistance of any aluminum casting alloy. Free machining, beautiful finish.

	MIN.	TYPICAL
Tensile strength, psi	50,000	55,000-60,000
Yield strength, psi	28,000	32,000-35,000
Elongation, 2"	16%	20%-30%

Acme Almag 35

The highest combination of strength, ductility, and impact resistance of any "as cast" aluminum casting alloy. Of special interest where heat-treatment is too costly or unobtainable.

	MIN.	TYPICAL
Tensile strength, psi	33,000	38,000-41,000
Yield strength, psi	16,000	18,000-21,000
Elongation, 2"	9%	10%-15%

ACME SERVICES: Aluminum, brass, bronze castings—patterns—tools—engineering.

TRIPLE A

CASTINGS BY Acme

ACME ALUMINUM ALLOYS, INC.

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increase was reported for steel conduit, cast iron pressure and soil pipe and nails.

According to latest FWA data, the building materials picture is now somewhat as follows:

February shipments of fabricated structural steel were down 6 pct, leaving unfilled contracts of 127,000 tons; pressure pipe output was up 10 pct but unfilled orders remained above the million-ton figure. While soil pipe production rose only 5 pct, the backlog picture was better with unfilled orders of only 287,000 tons.

Both output and inventories of radiation and convectors were up in January; production amounted to 5.4 million sq ft while inventories rose to 2.6 million sq ft.

Cancellations continue to exceed new orders for oil burners and production has dropped 55,000 units monthly; unfilled orders have been cut down from a million a year ago to 150,000 as of Feb. 1.

Shipments of warm air furnaces declined to 46,300 for January, well below the output of 62,000; stocks rose to 70,000.

January nail production rose to 68,900 tons as compared to 62,700 tons in December, and an average of 69,000 tons for 1947. Production in 1948 must average 83,000 tons in order to meet estimated demands.

Wabash Purchases $18 Million Equipment

St. Louis

• • • **Equipment to cost** a total of $18,745,483 has been purchased by the Wabash Railroad it was announced by Arthur K. Atkinson, president.

Included are two complete streamlined trains of lightweight cars and six lightweight sleeping cars. In addition 14 passenger coaches will be modernized. Other pieces of equipment ordered were one 2000 hp passenger locomotive; ten 4500 hp freight locomotives; six 4000 hp road locomotives; seven 1000 hp; and five 660 hp switching locomotives, all diesels; 6500 steel box cars of 50 ton capacity and 50 steel gondola cars of 70 ton capacity. In its own shops at Decatur, Ill., the railroad is building or modernizing 600 box cars, 400 hopper cars and 20 cabooses. Delivery of the new equipment already has begun. The company declined to state from whom the equipment had been ordered.

Personals . . .

(Continued from p. 112)

• **Earl C. Ginn** has been named executive vice-president of Continental Motors Corp., Detroit. Mr. Ginn was formerly vice-president in charge of engineering of the Muskegon Div. **A. C. Dykema,** controller, has been elected secretary and controller, and **William G. Raven** has been promoted from assistant secretary to vice-president in sales and executive offices at Detroit. **William C. Sears** has been elected assistant secretary.

• **Stuart N. Smith,** assistant superintendent, has been promoted to the new post of general superintendent in charge of all manufacturing operations of the Twin Coach Co. Buffalo Div. **Earl H. Lenz** has been appointed director of engineering for Twin Coach. Mr. Lenz was formerly with du Pont, Pierce-Arrow Motor, and Curtiss-Wright.

• **Sherman J. Farley** has been named sales manager for Scotch tape in the Buffalo Div. of the Minnesota Mining & Mfg. Co. He has been a salesman for the company in the New York State territory since 1943.

• **Frank J. Grunder** has been appointed assistant sales manager of the R. C. Neal Co., Buffalo. He formerly was with the Joseph Woodwell Co. in Pittsburgh.

• **H. Hartmann** has been appointed general manager of the Fresh'nd-Aire Co., Chicago, a division of Cory Corp. He has been with Fresh'nd-Aire Co. since 1944. **J. W. Wallace** has been appointed to serve as general sales manager, and **Lewis Seil,** chief production engineer of the company. **B. T. Rupp** has been named as the new southern sales representative and will cover Southern California. **John Steele** is new sales representative covering the Memphis and Little Rock area.

• **Murray Krause** has been appointed plant manager of Air King Products Co., Inc., Brooklyn. **Roland Kalb** is no longer connected with the company.

• **Doswell O. Winton** has been appointed regional sales manager in the states of Michigan and Ohio for All-State Welding Alloys Co., Inc. of White Plains, N. Y. Following his discharge from the Army in 1945, Mr. Winton worked as a field engineer with the Welding Sales & Engineering Co. in Detroit.

PERSONALS

• **Charles B. Miller** has been appointed district sales manager of Goodyear Tire & Rubber Co.'s mechanical goods division at Chicago. He succeeds **Guy E. McMahon,** who remains in Chicago as special representative for Goodyear industrial rubber products. Mr. Miller joined the company in 1937 and since 1945 has been Akron area field representative for the mechanical goods division. He is succeeded in Akron by **William F. Burdick,** who has been with Goodyear since 1937.

• **J. L. Stanford** has been made head of the Square D Co.'s switch and panel division, advertising section, Detroit. He was formerly manager of advertising and sales promotion for the automotive division of Thomas A. Edison, Inc. Mr. Stanford replaces **G. La Piner,** who leaves Square D to join Evans Products Co.

• **Robert W. Wolcott,** president, **Charles L. Huston, Jr.,** vice-president, and **J. W. Herman,** treasurer and assistant secretary of Lukens Steel Co., Coatesville, Pa., **Edward A. Worth,** chairman, and **William A. Worth,** treasurer of Worth Steel Co., Claymont, Del., and **L. R. Dohm,** president, and **E. C. Hopler,** treasurer of Warren Pipe & Foundry Corp., New York, have been elected to the board of directors of the E. & G. Brooke Iron Co., Birdsboro, Pa.

• **T. O. Lawler** has been appointed manager of stoker sales of Rheem Mfg. Co., Chicago. He most recently has been with A. O. Smith Corp.

• **Taylor D. MacLafferty** has been named manager of marketing of the Trumbull Electric Mfg. Co., Plainville, Conn. He had been appointed sales manager of the company in 1947.

• **H. V. Huleguard** has resigned as vice-president and general manager of the Whitcomb Locomotive Co., Rochelle, Ill., a subsidiary of the Baldwin Locomotive Works.

• **Ralph E. Hunt,** former production executive for Nash-Kelvinator and General Motors, has joined the executive staff of Dearborn Motors Corp., Detroit.

• **E. H. Reyer** has been named superintendent of the openhearth department of Keystone Steel & Wire Co., Peoria, Ill., succeeding the late **A. E. Getz.** Mr. Reyer has been associated with Keystone for 20

PERSONALS

years, starting as a tester in the physical testing laboratory, being promoted to steel plant metallurgist, and then assistant open-hearth superintendent.

• **Carl F. Jensen** has been appointed district sales manager of the midwestern area for Shakeproof, Inc., with his headquarters in Chicago. For the past 3 years he has served as field engineer for the company.

• **George L. Green** has been placed in charge of miscellaneous sales for Pullman-Standard Car Mfg. Co., Chicago. Mr. Green was formerly associated with the American Locomotive Co.

• **George W. Rukgaber** has been appointed district sales representative in the Chicago regional sales office of Electro-Motive Div. of General Motors Corp. Mr. Rukgaber has been associated with General Motors for 19 years, 15 of which were with General Exchange Insurance Corp. and 4 years with the corporation's department of public relations.

• **I. R. Kappler** has been named manager of the purchasing division of Dearborn Motors Corp., Detroit. He was formerly director of procurement for Republic Aviation Corp. and was also associated with Packard Motor Car Co.

• **John A. Dillon** has been elected a director of the Ralston Steel Car Co., Columbus, Ohio. Mr. Dillon was formerly vice-president of the Pittsburgh Screw & Bolt Corp. and more recently has been associated with the Office of Defense Transportation, Washington, and American Car & Foundry Co., New York.

• **Herbert H. Roosa,** sales manager of Manzel, Inc., Buffalo, has been elected vice-president in charge of sales.

• **John C. Trefts, Jr.** has been elected to the new post of chairman of the board of Farrar & Trefts, Inc., Buffalo, and **George M. Trefts** has been elected president, following the resignation of **John C. Trefts** as president. John C. Trefts will continue active in the company as a director.

• **R. J. Wean, Jr.,** executive vice-president, Wean Equipment Corp., Cleveland, has been named president, succeeding R. J. Wean, who continues as a member of the board.

J. R. Paisley has been named vice-president, in addition to his previous posts of general manager and assistant treasurer. **G. J. Ridgeway** has been promoted from assistant secretary to secretary, and **L. R. Connor** has been named assistant secretary.

• **Fred J. Walters,** formerly vice-president in charge of industrial relations for General Electric X-Ray Corp., Milwaukee, has been elected vice-president in charge of industrial relations of Hotpoint, Inc., Chicago.

• **James A. Wilson** has been appointed production manager of the Merrimac Div. of Monsanto Chemical Co., Everett, Mass. Mr. Wilson has been succeeded as plant manager by **Russell L. Miller,** formerly plant superintendent.

• **Joseph H. Quick** has been named vice-president in charge of operations of the Colonial Radio Corp., Buffalo. **G. A. Godwin** has been named director of manufacturing; **Robert MacLatchie,** administrative director of engineering, and **Harry J. Kenworthy,** director of materials. Messrs. Quick and Godwin formerly were with the Work-Factor Co. of Philadelphia; Mr. MacLatchie previously was in charge of a branch plant of Colonial, and Mr. Kenworthy formerly was with the Philco Radio Corp.

• **Robert W. Lesman** has been appointed sales engineer in Indiana for the Cross Co., Detroit.

• **Fred C. Williams,** general manager of the Packard Motor Car Co. of Canada, Ltd., has been elected a director of the Canadian firm. Mr. Williams has been associated with Packard for the past 11 years.

• **Fred B. Roth,** formerly supervisor of Monarch Machine Tool Co.'s service department in Sidney, Ohio, has been transferred to the West Coast as sales and service adviser to a number of dealers who represent Monarch there. He will make San Francisco his headquarters.

• **Julius W. Marx** has been named chief engineer at Newcomb-Detroit Co., Detroit. He was recently associated with General Motor's Corp. truck and coach division as plant engineer.

• **Marcus A. Acheson** has been appointed chief engineer for the radio tube division of Sylvania Electric Products Inc., New York. Mr. Acheson was formerly manager of the advanced development department of the company's central engineering laboratories at Kew Gardens, N. Y.

• **E. C. Lanno,** formerly of the Detroit Diesel Engine Div. of General Motors Corp., has been named development engineer of the Rockford Clutch Div. of Borg-Warner Corp., Rockford, Ill. He replaces **L. F. Mohns,** who has resigned.

• **Charles F. Hanks, Jr.** has joined the research department of Harbison-Walker Refractories Co., Pittsburgh. He was formerly associated with Westinghouse Electric Corp. in the research laboratory.

• **Donald W. Fleser** has been named resident manager of the Atlanta plant, Fisher Body Div., General Motors Corp. He was formerly assistant resident manager at Flint and has been associated with Fisher Body since 1927. He is succeeded at Flint by **George Cameron,** assistant resident manager of the Norwood, Ohio plant. Mr. Cameron joined Fisher Body in 1932 at the Pontiac, Mich. plant. He has been assigned to plants at Janesville, Wis. and Lansing, Mich.

• **John B. Morrow, Jr.** has been appointed personnel manager for the Southern Wheel Div. of American Brake Shoe Co., New York. Formerly superintendent of the division's plant in Portsmouth, Va., he has been with the Brake Shoe Co. for 28 years.

• **Sublette M. Walton** has been appointed industry manager of the Alumn-Drome Div. of Reynolds Metals Co., Louisville. Since his affiliation with Reynolds about 8 months ago, he has been serving in various capacities in the parts division. Prior to coming with the organization, he was president of the Craft Mfg. Co.

• **St. John E. McCormick,** 71, organizer and president of Rincon Foundry Co. of San Francisco, died recently. Mr. McCormick had also been president of the Central Iron Works of San Francisco.

• **William P. Ross,** 63, vice-president and a director of the Standard Tool Co., Cleveland, died Apr. 21. He had been associated with the firm since 1902.

• **W. S. Austin,** sales manager of LeMaire Tool & Mfg. Co., Dearborn, Mich., has been elected vice-president of the company. He will

also continue as sales manager. Mr. Austin joined the LeMaire Co. in 1947, having previously been associated with Foote-Burt Co. for a period of 27 years in engineering and sales.

• **Neil F. Ritchey** has been named an engineer in the technical service department of the Reynolds Metals Co., Louisville. The last few years he has been with General Electric in Fort Wayne, Ind., where he was a metallurgical engineer in charge of nonferrous metallurgy in the works laboratory.

• **H. T. Lintott** has been appointed general manager of operations of the Judson Steel Corp., Emeryville, Calif. He had been associated with Columbia Steel Co. from 1928 until 1946.

• **Wilson P. Hunt** of the Moline Tool Co., Moline, Ill., died Apr. 4. He was co-founder of the company in 1901 and served as president and general manager until 1926. Thereafter he acted as consulting engineer and held the office of vice-president until his death.

• **Halsey R. Philbrick,** president of Philbrick-Booth & Spencer, Inc., Hartford, died recently.

• **Edward N. Greenleaf,** 73, former Los Angeles district office manager for Allis-Chalmers Mfg. Co., died Apr. 10. He retired from the company in 1947.

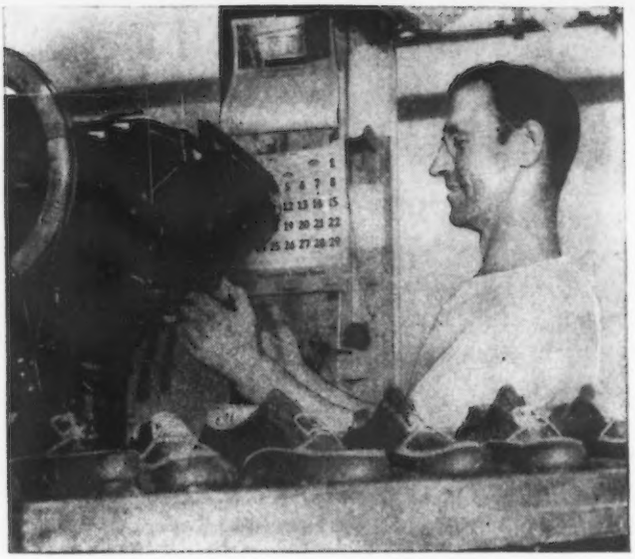
• **J. Lloyd Crawford,** head of the Detroit office of Fort Pitt Bridge Works, died Apr. 15. He had been in charge of the Detroit office for the past 10 years.

• **E. G. Mandt,** 58, southern district manager for the Jaeger Machine Co., Columbus, Ohio, died Apr. 20.

• **W. D. James,** president and general manager of the James Mfg. Co., Fort Atkinson, Wis., died Apr. 16.

• **James A. Farrell, Jr.** and **William F. Van Deventer** have been elected to the board of directors of American Car & Foundry Co., New York. Mr. Farrell is president and director of the Farrell Lines, Inc. Mr. Van Deventer is a member of the firm of Laidlaw & Co.

• **John W. Copeland,** for 24 years superintendent of the clerk's administrative office, American Steel & Wire Co., Worcester, has been made office manager of the Worcester district manager's department.



SHOE MAKING IS A PROFESSION WITH US . . . IN MAINE

"Maine is known the country over as a great center for shoe manufacturing. I happen to be one of thousands of men and women who work in Maine shoe factories, and I've been working in the same factory since I finished school. I'm proud of the work I turn out, and regard my job as a profession.

"Here in Maine we workers have a double interest in our jobs, for we feel that our industry is a part of our community. We think of our work as we think of our churches, our homes, our hobbies. It is all part of the welfare of all our people. We like to take an interest in community affairs, I am president of the Shoemakers Benefit Association, and master of the Franklin Grange.

"I own my own home, planned it and built it. I'm proud of my family. My son fought in the recent war under General Patton. My daughter is married and has a family of her own. Thousands of other workers in Maine feel as I do about working and living here. We know from long experience that Maine is a great State in which to live, work, play."

Melvin A. Heath

When you locate your factory in Maine, you'll find plenty of men and women like Melvin Heath in your organization. And you'll have moderately priced power; many raw materials close by; pure processing water; year-round production weather; nearness to America's greatest markets; excellent transportation; fair taxes; no State sales tax; no State income tax.

If you are planning to expand, to move, or to decentralize, it will pay you to investigate the industrial advantages of Maine. Write for free booklet, "Industrial Maine."

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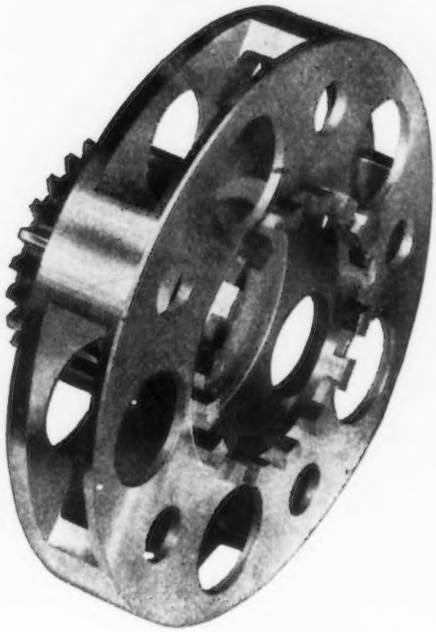
Years and years of

PRECISION GEARS



It has been a long time between gears . . . our first ones in 1902, and the gears* scheduled in our plant today. Between these gears lie the years of experience which are needed to produce the finest in precision gears.

*Shown here is an intricate planetary cage on which tolerances are maintained to tenths of a thousandth, and where slight warpage in carburizing and hardening would be disastrous.

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